Gas Journal

VOL. 306 113th YEAR LONDON, APRIL 12, 1961 No. 5093 PRICE 1/6

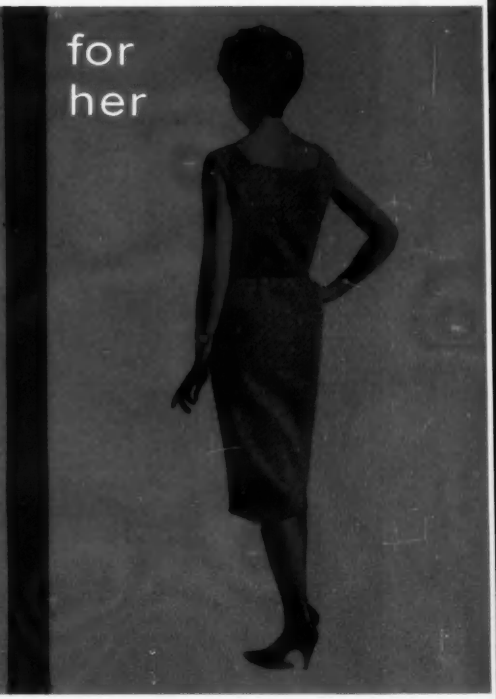
THE UNIVERSITY OF MICHIGAN

MAY 3 1961

ENGINEERING LIBRARY

New Diplomat Boilers* make life happier

for him...



for her

...SMAN. Here's a fully automatic ... salesman can sell with confidence. ..., clean-line appearance. Packaged ... for easy handling. Exclusive glass- ...eway protects against corrosion and ... maintenance. Certain to out-sell any ...parable boiler. *Very* competitively

THE INSTALLER. With these new gas-fired boilers, no installer need ever go grey before his time.

A new Diplomat is easy as ABC to install. Quick. Simple. Precise.

The casing is rigid and fits flush at first go. The door has lift-off hinges and magnetic catches which take all the snags out of hanging and lining-up.

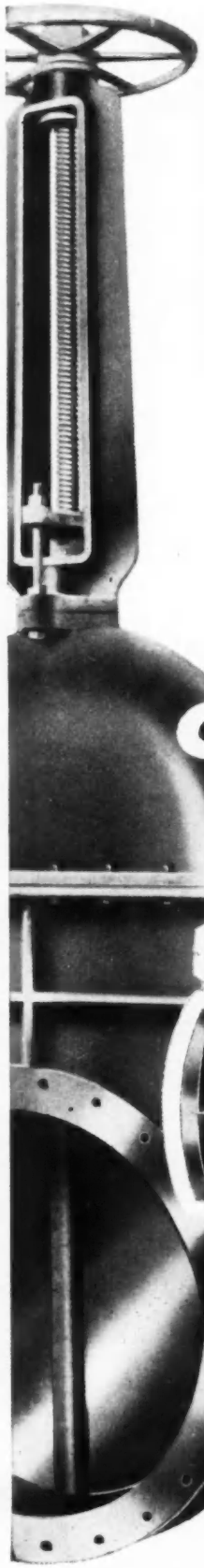
THE CUSTOMER. The Diplomat's big feature for the customer is the 5-way selector switch.

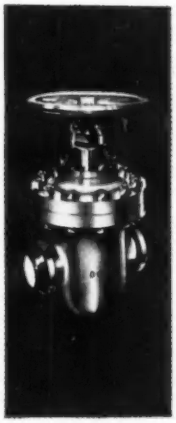
It provides heating and hot water at times they're wanted, without the customer lifting a finger. Installation time is reduced because all electrical connections are made by plug and socket. And wrong connections cannot be made.

* *Model illustrated is the Diplomat 44 small-bore unit, typical of this new range of boilers.*

Potterton Boilers at the heart of efficient gas central heating

...TTERTON IS A REGISTERED TRADE MARK THOMAS POTTERTON LIMITED, 20-30 BUCKHOLD ROAD, LONDON S.W.13. A MEMBER OF THE DE LA RUE GROUP





'FULBOR' VALVE

'C.L.' VALVE

'AIKEN' VALVE

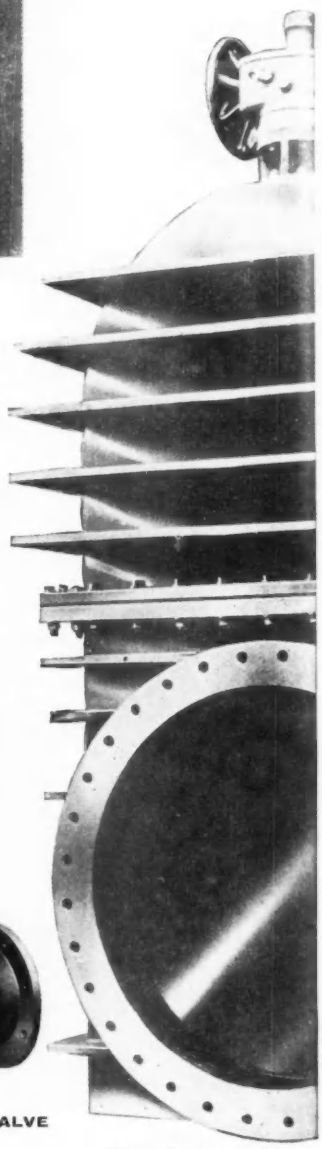
FULBOR—300 CLASS
Made in sizes from 3″ to 24″ Bore, particularly suited for high pressure pipelines up to 750 p.s.i.g. made with either flanged ends or welding necks.

C.L. VALVES
Made in sizes from 2″ to 24″ Bore, Cast Iron construction, Stainless Steel door, suitable for working pressures up to 100 p.s.i.g. on various types of gases. Flanged ends, Internal Screw operated.

AIKEN VALVES
Made in sizes from 3″ to 15″ Bore, Cast iron spectacle plate, it is essentially a simple and economical low pressure valve, ideal for gas and a wide variety of chemicals. Internal Screw operated.

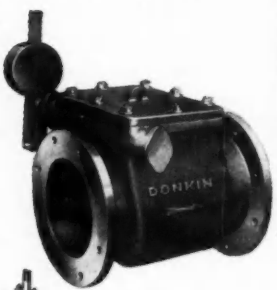
COKE OVEN VALVES
Made in sizes from 2″ to 72″ Bore. Internal or External Screw operation. Full Clear Bore suitable for gases or air, may be motorised or hydraulically operated and supplied for vertical or horizontal locations.

BAURER VALVES
Medium pressure valve, made in sizes from 4″ to 48″ bore, or larger if required, with cast iron or fabricated mild steel bodies. Working pressure on large sizes up to 45 p.s.i.g. Internal or External Screw operation. Can be motorised or hydraulically operated.

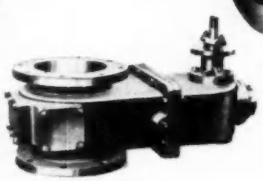


'BAURER' GAS VALVE

GENERAL SERVICE VALVE



NON-RETURN VALVE



'HICKS' VALVE

COKE OVEN VALVE

GENERAL SERVICE VALVES
Made in sizes from 2″ to 18″ Bore. Internal Screw or External Screw operation. Hydraulically tested up to 260 p.s.i.g. All iron construction, suitable for gases and a wide variety of chemicals. Alternatively can be fitted with gun-metal doors and seatings for use on water.

The BRYAN DONKIN Company Limited

CHESTERFIELD Telephone 3153 **LONDON Telephone ABBey 1096**

Photo by Guy Gravett

No kidding

...if your problem is flame protection or thermostatic control

PERL

CONTROLS LTD.

can solve it

For full details of Perl flame-protection systems, automatic igniter sets, magnetic and relay valves

write

Fleming Way, Crawley, Sussex or 'phone Crawley 25115-6-7

— and see !

Gas Journal

VOLUME 306 • NUMBER 5093 • 113th YEAR

WEDNESDAY, APRIL 12, 1961

CONTENTS

EDITORIAL COMMENT

Has the N.C.B Left It Too Late? - - - - 47

Gas Goes to College - - - - - - - 48

SPECIAL ARTICLE

Wood Distillation. By M. Schofield - - - 49

TECHNICAL RECORD

Storage and Handling of p.f.d. and l.p.g. By A. G. Palmer - - - - - - - - - - 54

TECHNICAL DEVELOPMENTS

At the Ideal Home - - - - - - - 60

NEWS SUPPLEMENT

Robens Opens Big Coal Sales Drive - - - - 64

Output —Hot and Cold - - - - - - - 64

Eire Search Soon for Oil, Gas - - - - - 64

Cheap Gas: Will M1 Pipe Scheme Give the Answer? 64

Coal Washery for Canada - - - - - - 64

Management Consultancy Helps U.K. Gas Industry - 65

Russians See Room Heaters - - - - - 65

Gas Board Seeks an Actor - - - - - 65

Yorkshire Juniors Draw Crowd - - - - 65

Gas Support for Cookery Exhibition - - - - 65

Here and There - - - - - - - - 65

Gas Workers' Holidays - - - - - - 66

Correspondence - - - - - - - - 66

Coming Events - - - - - - - - 66

Personal Notes - - - - - - - - 66

Obituary - - - - - - - - - 66

Editor :
GEOFFREY W. BATTISON

Assistant Editor :
WALTER F. TRUMAN

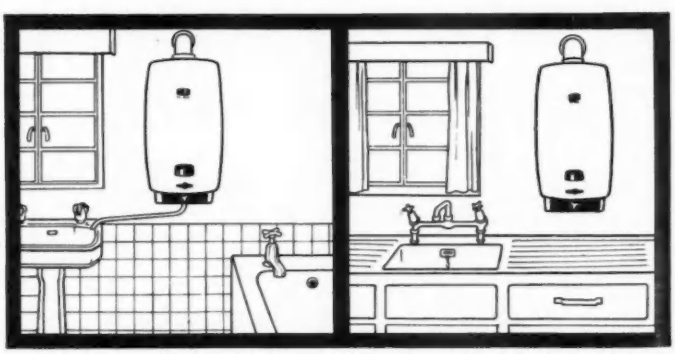
Technical Editor :
CHARLES J. P. DE WINTON
T.D., M.A., M.I.Gas E., M.Inst.F.

PUBLISHERS' NOTICE, SEE PAGE 69

3 reasons why the TRITON will sell!

- ideal as a single-point bath water heater
- unexcelled as a dual-point bathroom heater to serve both bath and basin
- admirable as a multi-point, installed at the kitchen sink, to serve this and both bathroom points.

The 'Triton' offers new and modern styling with integral draught baffler, flush fitting and exceptional freedom of access for normal maintenance, substantial construction with all water joints hard soldered. These are but a few of the special features of the 'Triton'—ask for full details.



It's modern, it's multipurpose, it's MAIN!

MAIN MORLEY LIMITED · PADIHAM · LANCS.

W120

Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

Has the N.C.B. left it too late?

THERE can be little doubt that the vigorous attitude now being taken by Mr. Alfred Robens, Chairman of the National Coal Board towards the sales of coal, should have a stimulating effect on all those with the future of the industry at heart. Mr. Robens seems to be the type of man who is prepared to put words into deeds; he is also no mean publicist. His most recent comments on the coal industry's plans must be considered in relation to his statement last October shortly after his appointment had been announced. He made it clear then that the target for the N.C.B. would be 200 mill. tons a year and in his most recent Press conference he confirmed it, pointing out that the industry's output would be maintained at this level and would not be raised any higher.

At the time of the original statement, our comment was that this target seemed unrealistic, since, as we pointed out, there were so many tendencies towards a fall in demand for solid fuel generally and coal in particular. Once a market was lost, it was difficult to recapture it.

The chief reasons for this appeared to us to be the need to comply with the Clean Air Act, and the added costs and inconvenience of handling solid fuels. The use of refined fuels, either fuel oil itself or some other refinery product on the one hand, or gas or electricity on the other, did seem to be more in accord with the demands of industry and the housewife than did solid fuels, however smokeless they might be.

The price of coal, too, has in the past shown a most regrettable tendency to rise. This has not only thrown out other industries' budgets, but has eventually caused increases in production costs which have endangered their competitive position.

At his Press conference, Mr. Robens made it clear that some of these points at any rate have been recognised, and that significant changes are to be made in the N.C.B.'s attitude towards its customers. Mr. Robens clearly believed that the miners' wages would rise as the desire for a better standard of living made itself felt, but he considered it an absolute 'must' that price stability should be maintained. How can this possibly be done? Clearly productivity would have to be increased and a greater degree of mechanisation developed. Power loading has been stepped up from 40% to 44% in the first three months of the year and should be 50% by the beginning of 1962. Output per manshift, thanks to the 'tremendous trade union co-operation' and the absence of Ludditism, was constantly increasing, the Chairman pointed out, so there seemed to be every chance of his goal being attained.

We feel we must ask ourselves how it is that these improvements in the pits should have become apparent so suddenly. It may well be that the enormously expensive and intensive work carried out since nationalisation on a number of collieries insufficiently equipped mechanically, is at last coming to fruition and, by making it possible to increase production and cut costs, speeding the closing of uneconomic pits. If so this turning of the corner has happened very conveniently for Mr. Robens' début.

Have the industry's difficulties of the last few years brought home to all concerned the vital need to cut out restrictive practices and to get on with the job of coal production? We do not know, but we can at least hope that a salutary lesson has been learnt, otherwise we may well be listening to old arguments propounded with greater conviction.

Clearly the cutting of costs of coal production is important to the N.C.B., but selling coal successfully in the face of intense competition is a much harder nut to crack. On this aspect of the Board's policy, Mr. Robens made a number of points which may be divided under three main heads: Better distribution, improved appliances, and an improved product.

Under the first heading Mr. Robens proposes to decentralise coal stocks built up at the collieries during the summer months. Instead, coal will be immediately taken to distribution centres, and the use of mechanised depots increased. Merchants will be encouraged to spread customers payments throughout the year and coal prices will be reduced by £1 per ton during the summer. Meanwhile the N.C.B. is encouraging the appliance manufacturers to design domestic boilers and grates to burn coal smokelessly, the former to burn for long periods without attention, with the object of furthering an all-out drive on the domestic central heating markets. Under the third heading, we have the speeding up of the

building of coal preparation plants and the production of the new ' cheery ' type of smokeless fuel.

The first point needs little comment but the last two immediately raise doubts and objections. The manufacture of these new appliances is likely to be distinctly expensive, and only those who are prepared to put their loyalty to coal before convenience, and their love of the open fire before cleanliness and relief from drudges, are likely to buy them. The real mass market may never be reached—indeed, this development is at least five years too late. The other point is the tardiness of the appearance of this new smokeless fuel. We feel that the gas industry, whose interest in solid fuel is only secondary, has shown more initiative than either the N.C.B. or the Coal Utilisation Council in this particular matter. The new N.C.B. fuel is already assuming the comic mantle of the ' groundnut ' scheme, towards the result of which the ordinary observer adopts the attitude ' I'll believe them when I see them.'

The gas industry's history has been too closely linked with coal for us to be other than sympathetic towards the Coal Board's problems; indeed, a lively and efficient coal industry is essential to the well being of the country. If our ties with coal are looser now than in former years it is not from choice but from necessity. In the meantime we are becoming a strong competitor of coal on the domestic market and, much as we respect Mr. Robens' initiative and drive, we think it would take more than this Rip Van Winkle resurgence of coal to halt the gas industry's space and central heating drive.

Gas goes to college

THERE appears to be some likelihood of ' image ' becoming a dirty word. Whenever it is used in gas circles these days—and that seems to be every two minutes—the speaker invariably starts by remarking how much he dislikes the word. Yet there is not anything intrinsically wrong with it; it is just that one has to keep on using it. Efforts to find substitutes have proved fruitless; we will draw a veil over such clumsy horrors as ' social perception ' and the like. The blunt fact is that the image is here to say and we must accept it—even Mr. C. H. Leach, who, having permitted his Board's second one-day sales conference to bear the theme ' Improving the Image ' (now where have we heard *that* before?) could not resist making reference to ' that ghastly, narcissistic word.'

The conference, which was held in the dignified and scholarly surroundings of Balliol College, Oxford, considered the image from three aspects—technical, sales, and installation practice, the first being dealt with by a visiting speaker, and the other two by members of the Board's Sales and Service Circle.

To describe the technical contribution towards image improvement who better than Mr. L. W. Andrew, Director of Watson House Centre, whose passionate belief in the merits of gas, based as it is on scientific fact, is enormously infectious?

The key question, said Mr. Andrew, was—why should anybody use gas? It must be because it was better, or cheaper, or more reliable. He deftly ranged the advantages of the fuel—speed, flexibility, flame visibility, instantaneous heat, cleanliness, reliability—against the disadvantages—the need to light it, to remove products of combustion and to cope with a toxic product. Research and development work, he said, was aimed at cashing in on the advantages and minimising the disadvantages.

Who can doubt Mr. Andrew's assertion that the gas industry boasts the most detailed and thorough testing system of any fuel industry?

Clearly Mr. Andrews sees the future of domestic gas usage as based on the provision of a complete heat service, with flexibility as the ace in the pack. In the meantime, however, there must be more controlled field trials and the greater exchange of information.

Mr. E. J. Edens' paper ' Improving the Image of Gas by Creative Selling ' proved to be a straight-forward sales paper to which the ' image ' label had been attached, rather as a milliner might enliven a familiar hat in the window with a showcard saying ' Fresh from Paris.' However, we happen to know that in his capacity as Showroom Manager at Oxford Mr. Edens has done some effective public relations work for gas.

The third paper, ' Improving the Image of Gas through Installation Standards and Practices ' took as its theme the idea that many people are adversely influenced towards gas by having to live ' in surroundings festooned with " clothes line " compo piping, rusty iron piping or " clothes hook " fittings which stick out of the wall, all providing a doubtful supply of gas.' The author, Mr. A. W. Farmer, Senior Technical Representative in the Reading Region, believes that ' there has been complete neglect on the part of the gas industry to recognise that our past installation practices have done more than anything else to destroy the image of what was at one time accepted as the premier fuel.' He described the extraordinary situation in which a British gas appliance, built to one of the highest standards of its kind in the world, is allowed to be married to materials, the standards of which only just satisfied the requirements of five decades ago.

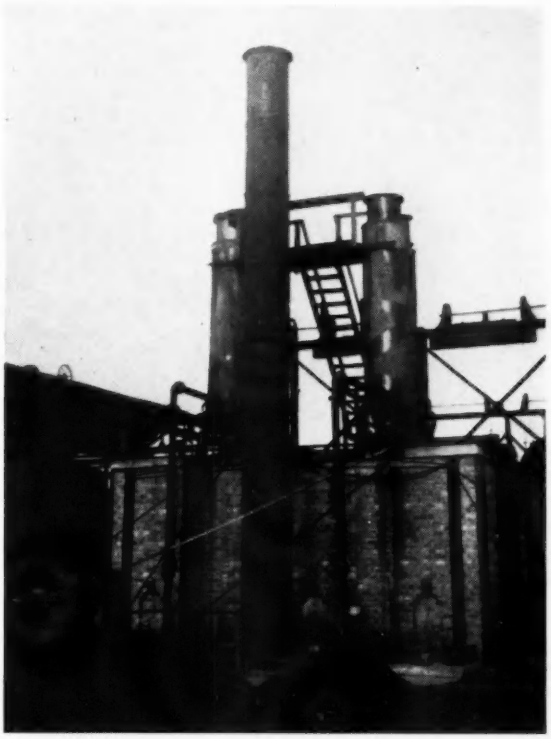
There is a good deal in this, for although much has been done to improve and standardise installation methods, some indifferent work is still being done, and little or no effort seems to be made to tidy up old installations—at least until they fall apart. Mr. Farmer's comments (which will be reported at some length in the April issue of ' GAS SERVICE ') on co-axial meters and specially designed plug-in points with flexible connections to appliances are of considerable interest.

WOOD DISTILLATION

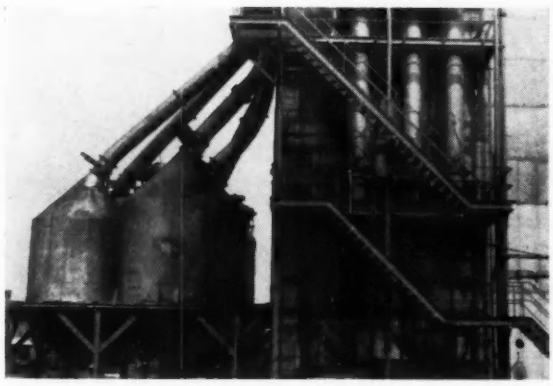
—A POOR SISTER TO COAL CARBONISATION

JUST 300 years ago Robert Boyle told of a spirituous liqnor obtained from the pyroligneous distillate from heating wood, while 150 years ago methyl alcohol was recognised as an individual chemical product.

These anniversaries bring to mind the remarkable ups and downs of the wood distillation industry compared with, or in contrast to, the continuous growth of its sister industry producing coal gas. Both industries sprang from the activities of two enthusiasts in the 1790's, namely Murdoch with his rough distillation of coal at Redruth, and Philippe Lebon with his fanatical faith in wood gas as an illuminant for Paris streets.



Rear of the oven retort at the Forest of Dean works.



A Lambiotte retort at Worksop, with charcoal bins on the left.

Storage vats for distillates

Wood distillation had an earlier phase during the centuries of charcoal-making, when some tar for preservative purposes was recovered. Yet Lebon's unsuccessful struggle to create an illuminating-gas industry, based on wood as raw material, proved a spur to retort distillation in which both horizontal and vertical retorts of many types were tried.

The growth of the two industries during the last century and a half provides an absorbing subject, especially since wood distillation, considered dead but refusing to 'lie down,' has been revived or roused to a highly efficient working with the introduction of continuously-operated vertical retorts using inert gases for internal heating.

Again and again the obituary notices have been written; yet the old industry has revived just as the even older charcoal-burner rises like a phoenix from the ashes of previous burnings, now using portable charcoal kilns in place of obsolete meilers or wood heaps.

By M. SCHOFIELD

Ancient charcoal became replaced by coke in iron-smelting and as fuel, the two products being prepared by very similar processes at one period, when giant brickwork kilns for charcoal-making strongly resembled beehive coke-ovens; and when the horizontal retorts of wood distiller and gas manufacturer were also similar.

Both industries yielded a tar containing creosotes for preserving wood, though wood tar proved the more expensive and never developed to such large-scale use in comparison with coal tar. Although coal gas dealt the death

blow to Lebon's wood gas, the gas industry in producing tar revived the wood carbonisation industry a century ago.

This revival came when Perkin's newly-created coal tar dye industry required methyl alcohol for 'methylating' dyes and also as solvent in converting them to further colours.

In 1859, for example, Verguin of the Collège de Lyon, while experimenting on the oxidation of aniline, discovered magenta or fuchsine. This dye in turn was found to be oxidised in wood spirit solution to other dyes by Frank and Grüner; and in the 1860's there came a vigorous demand for methyl alcohol for producing Britannia Green at Perkin's Greenford works, for iodine or Night Green, and for Lauth's methyl violet.

Further spurs to wood distillation were also from the dye industry, when acetates from pyroligneous acid proved invaluable as mordants.

Influence on gas industry

To appreciate the reverse effect, that is, the influence of wood distillation on the growth of the gas industry, one turns not only to the first cylindrical retorts, but also to Lebon's work in France. Murdoch was making little or no progress in getting his gas lighting ideas adopted by Boulton and Watt until Gregory Watt wrote from Paris on the lighting of Lebon's house and the Hotel Seignelay by wood gas.

Murdoch, with his steam tricycle and his lighting of his Redruth house with coal gas, was regarded by Watt as something of a crank or eccentric, a man to be deterred from any other ideas than developing steam-engines.

But when Gregory Watt sent his report, warning the Soho Foundry partners that if they were to take the lead in developing Murdoch's lighting schemes, it was time to make a start, then the entire viewpoint changed. Boulton and Watt spent up to £5,000 on gas-producing apparatus, and made thousands of feet of piping and hundreds of burners.

Philippe Lebon, at times called D'Humberson to distinguish him from his brother, was an engineer trained in the Ecole des Ponts et Chaussées before taking up a government post in the Department of Bridges and Roads. In 1797 he was dabbling with his idea to produce gas from wood, almost at the same time that Murdoch and Boase of Redruth were heating coal in a kettle to yield gas.

Met with ridicule

While Lebon was on a visit to his father at his native Brachay, he charged a glass retort with sawdust and set alight the issuing gas. Next he fitted his first practical retort in the back-yard of his father's house, conveying the gas to washing-plant and thence to an inverted vat as gasholder. Lebon met with the same ridicule that Murdoch experienced; yet the eminent chemist Fourcroy encouraged him, especially when he expanded his gas-making scheme to the Ile St. Louis in Paris, a place to which he came on several occasions from his engineering work at Charente.

As early as 1796 he took out a patent, while three years later he sent a full report to the Institut describing a 'New method of using combustible substances more usefully for heat and light and of recovering various by-products.'

When it was pointed out that products of combustion from his lighting scheme would be objectionable in houses, Lebon designed his 'thermo-lamp,' with pipes for gas and air and a third pipe for leading away combustion products.

His gas lighting efforts failed, however, yet with the granting of a concession to work the wood tar factory near a large forest in the Havre area, Lebon became the father of wood distillation. His end was unexpected, for he was assassinated in the Champs Elysées.

Although some decades later wood distillation was adopted in France with her rich resources of forest waste, the industry was even better sponsored by enthusiasts in Britain. In 1796, the year in which Lebon took out his patent, an independent move came with John Aldred starting a charcoal works at Rotherham to supply the iron industry.

Like Murdoch with his association with Dr. Boase, Aldred had as collaborator or adviser on the scientific side, a medical man who probably influenced him in turning to acetic acid recovery for making iron liquor or acetate as mordant. Aldred moved to Chesterfield, then to Killimarsh, and finally to Worksop in 1804, the centre of British wood distillation since then. Worksop has seen all aspects of the industry developed from iron cylinders to huge oven retorts, and now to the most modern vertical retorts.

At a later period a second factory at Warminster was operated for some years, while at Speech House Road in the heart of the Forest of Dean a third factory came, this being the only one in Britain today still working the huge Jumbo or oven retorts.

This works was formerly owned by the Lydbrook Chemical Company until Thomas Newcomen took it over in 1893. Newcomen along with Aldred of Worksop was the last of the older wood distillers, supplying acetone and crude wood spirit as well as acetic acid and charcoal.

Other units set up

Meanwhile there came other wood distillation units, often on a small scale and at times seeking to utilise accumulations of wood waste produced locally. There were firms carbonising bobbin chippings in Lancashire and at Paisley, while other firms at Swinton and elsewhere were using retorts to carbonise small waste from wood-working concerns.

One prominent leader in British wood distillation was Turnbull of Glasgow, who not only built a factory at Milburn in the Vale of Leven, but built and operated with Scottish workmen a wood distillation works at Milburn, U.S.A. Turnbull's plant was typical, with 9-ft. iron cylindrical retorts in pairs.

All such cylindrical and occasionally rectangular retorts gave way to the large Jumbo or horizontally-slung ovens, these being the standard for decades, before many of them gave way to the modern inert gas-heated retorts.

Such oven retorts were the result of a demand for mechanical charging and discharging of charcoal without loss of heat when a cooling-down period is necessary, as with the old cylindrical retorts.

Each oven holds a charge of 20 tons wood waste in four steel lattice-cars, the iron doors being closed after charging while an outer storm door is also used for heat conservation. During the 24-hour carbonising period first water vapour and wood gas come over, these followed by further gas plus the dark pyroligneous distillate.

When the exothermic decomposition of wood sets in, stoking is reduced while wood naphtha, hydrocarbon gases and tar vapours are evolved, a final hot fire driving off less volatile products and ensuring the absence of 'foxey' or half-carbonised charcoal.

From 20 tons wood waste are obtained 2,650 gall. of pyroligneous acid, six tons of charcoal and five tons of wood gas; the pyroligneous acid is more concentrated or reduced in volume when wood charges are dried by combustion gases before charging.

Wood gas is of poor quality, with 50 to 57% carbon

dioxide, 33% carbon monoxide, 3.5% methane, 3% hydrogen, with the rest mainly water vapour. This gas, with a composition which explains why Lebon could not have succeeded on any scale, is burned beneath the oven retorts.

Alternatives to Jumbo oven retorts have been tried on a considerable scale, at times with much ingenuity, considering the poor outlook for wood distillation products following the vigorous development of 'synthetic' methanol, acetic acid and acetone.

Thus at Iron Mountain, Michigan, the Ford Motor Company adopted the Badger-Stafford carbonising plant, which made full use of the heat of exothermic decomposition of wood. At the base of the vertical retort—insulated on the exterior instead of requiring external heating—a small fire is started, this beginning the carbonisation of the wood charge.

Two-week operation

Hogged wood waste is continuously fed into the top of the 40-ft. long retort and charcoal withdrawn via a butterfly valve below, the 8-in. pieces being pre-dried to 5% moisture content before charging. A two-week operation of each retort is common before withdrawing from use for burning-out accumulated pitch.

During the last two decades wood distillation has adopted inert gas heating as the answer to the problem of heat losses through retort walls and through gaps in the charges of forest waste. Thus in 1942 the Swiss industry saw two units built in which vertical retorts carbonise hogged wood waste heated by oxygen-free inert gases rising through the wood mass and bringing it to decomposition point.

The gas dries the wood charge and leaves the retort at 212°F., while tar, methanol and acetic acid vapours pass to the condensers. The charcoal is removed continuously via a valve at the base of the retort and is passed to cooled containers or conditioners where oxygen absorption has to take place before marketing.

Even more striking than this Swiss process operated at Ticino, were other carbonising plants using inert gas heating. The first of importance in the war years was that of Reichert.

This batch process uses a vertical cylindrical retort with conical ends, condensable vapours passing through condensers and scrubbers to leave wood gas, part of which is used to heat the remaining gas to 500 to 600°C.

This hot gas is sent downwards through the wood mass at a rate high enough to avoid any condensation of tar. Carbonisation proceeds at a controlled rate throughout the charge, exothermic heat developed in the distillation zone serving to pre-heat the lower uncarbonised zones.

In 1939 there appeared the first patent of Lambiotte, the inventor whose continuous automatically-charged retorts heated by inert gas, represent the most modern wood distillation plants at present. The Lambiotte technique has been adopted at Worksop and elsewhere for ensuring the survival of an industry always the poorer sister of coal carbonisation.

In this type of retort heated gas is introduced midway up the vertical retort instead of at the top, a small amount of cooler gas also being brought in at the base of the retort to cool the charcoal before it passes to the conditioning bins.

The counter-current movement of wood and inert gas is so regulated that wood becomes finally dried in the upper part of the retort before passing to the distillation zone lower down. The wood is hogged to 1-ft. lengths, pre-dried in tunnel driers down to 15%, thus banishing the bane of wood distillers, the high fuel cost in concentrating a dilute pyroligneous liquor resulting from wood waste with 45% moisture.

The hogged wood is fed to the top of a retort via a skip hoist, charging being automatically controlled by a dip-stick type of control determining the level within the retort itself.

Conveyor for charcoal

Charcoal passes via a conveyor belt from the retort base to conditioning bins, while gas and volatiles pass from an outlet pipe near the top of the retort; much of the wood tar is scrubbed from this vapour by use of a cold spray of pyroligneous acid.

From the de-tarred pyroligneous liquor, wood spirit is removed in a stripping column, while the stripped acid liquor is submitted to an azeotropic distillation using butyl acetate as solvent, to yield acetic acid far more efficiently than in the older recovery with calcium acetate. This Lambiotte process, with higher yields and greatly increased efficiency, is the answer today to the belief that wood distillation has become obsolete.

BOOK REVIEWS

YEAR BOOK OF THE HEATING AND VENTILATING INDUSTRY

THIS is the thirteenth issue of this year book, which provides technical, contractual and other trade information for all those who come in close contact with heating and ventilating contractors. It is issued in collaboration with the Association of Heating, Ventilating, and Domestic Engineering Employers.

There are several specialised articles, the subjects including design problems of radiant heating, the thermal behaviour of a building, and boiler water treatment.

Information of a reference type is given on a wide range of subjects. It incorporates details of working agreements, relevant British Standards, and bylaws. There is also a list of members of the two associations concerned.

For the guidance of those wishing to consult those concerned with this work there is a section giving a buyers' guide, trade names, manufacturers' addresses, associations, and consulting engineers.

TECHNITRADE JOURNALS LTD.,
PRICE 15s. POSTAGE 1s. 6d.

★ ★ ★

THE ENGINEER BUYERS GUIDE 1961

THE 1961 edition of this book has recently been published. It contains details of forthcoming engineering and industrial exhibitions, lists the associations, institutions and societies connected with the engineering industry, and national undertakings with their divisions and addresses.

There is a list of firms with their addresses, one of U.K. agents for foreign firms, and another of trade names.

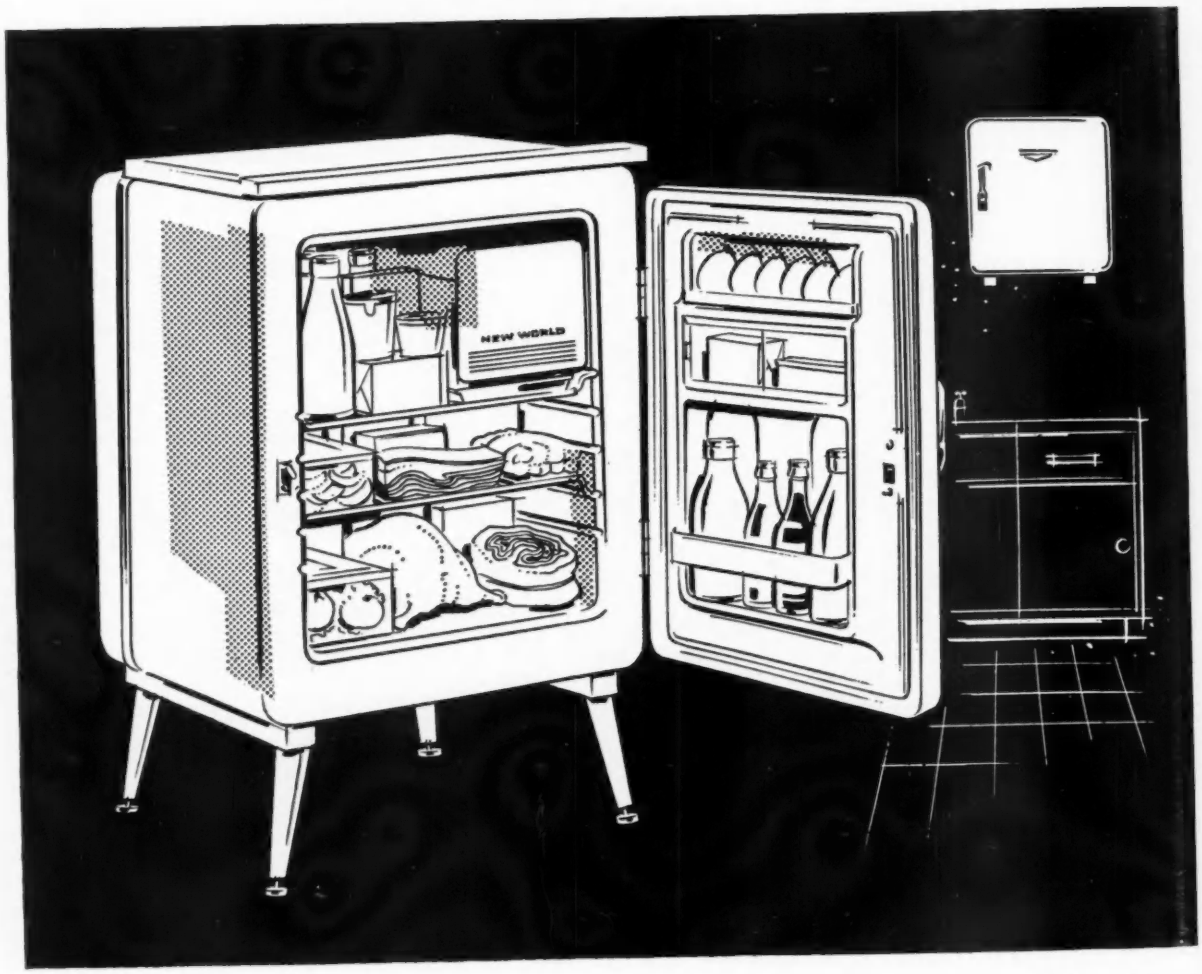
In the Buyers Guide section is the classified index of firms, which also come under main headings including chemical plant, engine parts, machine tools and sheet metal working machinery.

MORGAN BROTHERS (PUBLISHERS) LTD.
PRICE 10s. POSTAGE 2s.

A SUCCESS

THE ADAPTABLE NEW

FROM EVERY ANGLE...



NEW WORLD

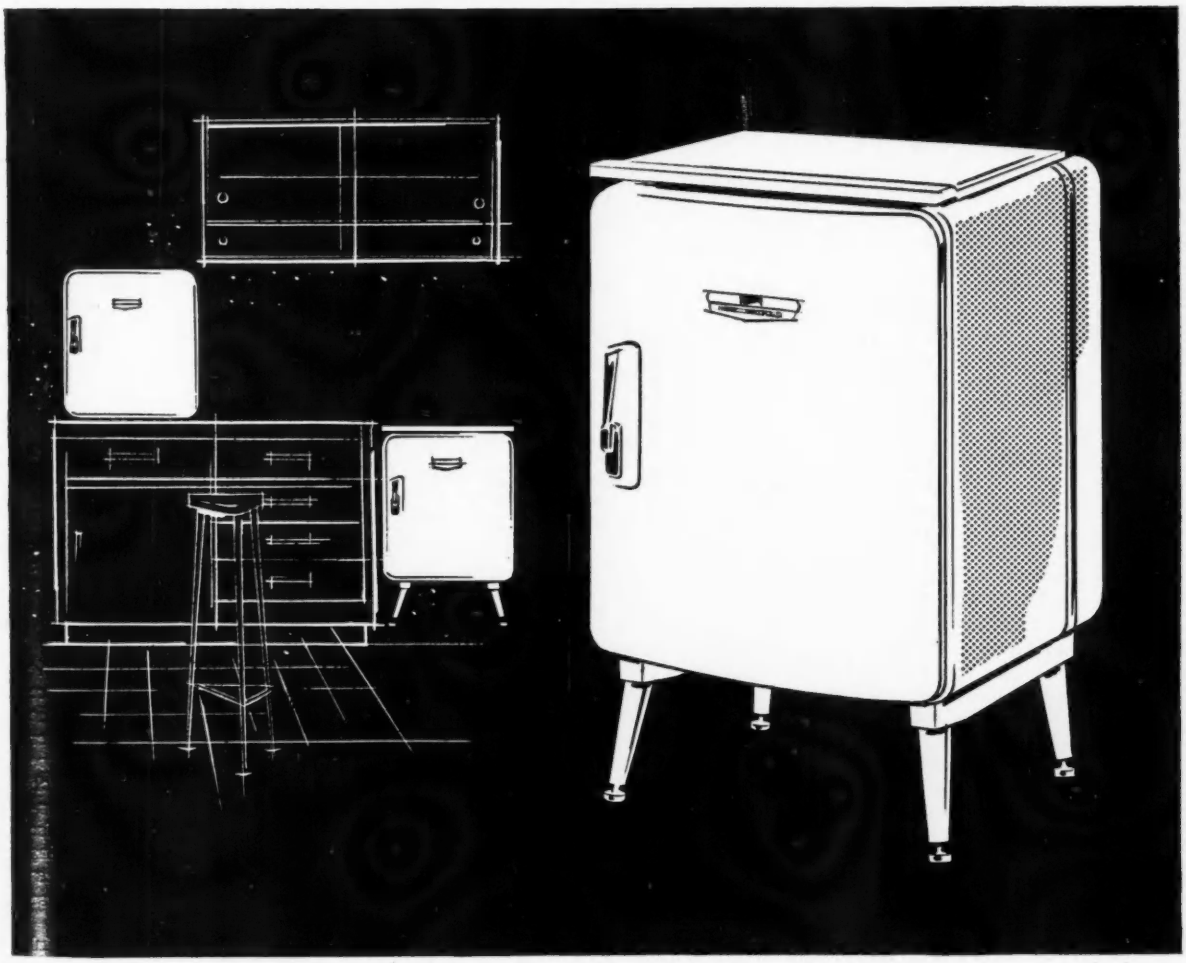
WORLD

200 GAS REFRIGERATOR

It's easy to find space for a New World 200 . . . it works equally well on wall, floor or table.
It's easy to see the New World 200 is a bargain . . .

- Will fit neatly into the smallest kitchen
- Roomy yet compact
- Economical—costs less, uses less gas than others
- Noiseless in action
- Non-chip, non-rust, all-plastic cabinet

It's easy for your customers to afford – the cheapest gas refrigerator on the market.



RADIATION DOMESTIC APPLIANCE CENTRE: 59/65 BAKER STREET · LONDON W1

For Postal enquiries please write to the Head Office:

RADIATION NEW WORLD LIMITED · RADIATION HOUSE · NORTH CIRCULAR ROAD · LONDON NW10

Telephone: WILlesden 1234

GAS JOURNAL April 12, 1961

From a paper read to the London and Southern Section of the I.G.E.

The storage and handling of p.f.d. and l.p.g.

By A. G. PALMER, M.B.E., B.Sc.(ENG.), A.M.I.MECH.E., A.M.I.GAS E.,
DESIGN OFFICE MANAGER,
NORTH THAMES GAS BOARD.

IN the last five years, alternative fuels have been introduced into the gas industry at what might well be termed an alarming rate. For many years the gasworks has been a place which presented few hazards of fire and explosion in spite of the large quantity of gas handled and in few places was it necessary to restrict the use of naked lights.

Light distillates and liquid petroleum gases are now being used at an increasing rate on water gas plants for enriching and reforming, in retort houses and finally on specially designed plant for reforming at high efficiency. Thus, the gasworks is rapidly approaching the condition of an oil refinery, but an equally rigid control for safety on the works is less easily applied.

Perusal of the Petroleum Consolidation Acts 1928 shows that light petroleum distillates are within this Act, but that liquid petroleum gases are *not*, since the liquid cannot be tested in the Abel flash testing equipment.

Control of storage conditions

Thus the Petroleum Consolidation Act gives the local authority powers to apply 'such conditions to a licence to store petroleum spirit as they may deem necessary to ensure the safe keeping of petroleum spirit.' The local authority has therefore a rigid control over its conditions of storage; they can exercise it in any way they like.

L.p.g. is not within the scope of the local authority unless it is stored in close proximity to petroleum spirit, when conditions could be attached to that licence to ensure its safety.

Although l.p.g. is not governed by local authority licence this should in no way mean that the standard of safety required in its storage and use should be any less than that for petroleum spirit; on the contrary, in some respects, the standards needed may well be higher.

Light petroleum distillate is a generic term for a wide range of refinery products with a flash point well below the 73°F. referred to in the Petroleum Regulations and may even be well below 50°F. Its vapour pressure as found by the Reid equipment will usually be about 10 p.s.i., but may be 20 p.s.i., so under atmospheric conditions, it will give off vapours within the explosive range.

Losses due to evaporation will, therefore, be high. If large volumes of heavier-than-air vapour are discharged to the atmosphere, a dangerous condition can easily arise on a calm still day when the barometer is high.

Liquid petroleum gas covers butane, propane and the allied substances which are gases at normal atmospheric temperature and pressure but can be kept liquid by maintaining a pressure equal to or greater than their vapour pressure. Mixtures of them will, of course, produce vapour pressures between the values for butane and propane.

The explosive ranges in air are (a) butane, 1.6% to 8.5%, and (b) propane 2.4% to 9.5%. The great feature of the gases is their very high specific gravities (air=1) which are (a) butane 1.90 to 2.10, and (b) propane 1.40 to 1.55.

There is, therefore, a marked tendency for these gases to fall to the ground and flow along its contours until dispersion or diffusion takes place, which makes them markedly different from the gases which the industry is used to handling; a fact which must be made known to all persons concerned with storage and handling.

It is most important to emphasise that the whole design and operation of the plant and equipment to be used for light distillates and l.p.g. must be to such a standard that no leakage, however small, is tolerated. The tell-tale signs of dampness—with distillates—or of snow—with l.p.g.—must be attended to immediately, since they can soon result in a dangerous condition particularly inside a building.

In this paper, reference will only be made to the storage of l.p.g. in pressure containers, and not to refrigerated storage which, though not yet in vogue, is likely to come before long.

Generally speaking, light petroleum distillate can be stored at atmospheric pressure in normal oil storage tanks. It can, however, have such a high vapour pressure as to necessitate storage in pressure spheres or containers, but since this high vapour pressure material is not in general use no special reference will be made to it. It is, however, sufficient to say that such storage is very similar to the storage for l.p.g. but at rather lower pressures.

High evaporation

With the high evaporation of the liquid, it is preferable to store light petroleum distillate in tanks which are vented to the gas stream; thus the calorific value of the vapour can be usefully employed and possible danger avoided. Unfortunately, this practice is rather at variance with the Customs and Excise Authorities, since such material is only duty free providing it is reformed into non-dutiable gases and oils. The Customs and Excise Authorities, however, appreciate the benefits of keeping the vapours within the plant, but must of necessity, press for action to be taken to reduce the volume of these vapours to a minimum.

Operating the tank within a range of pressures is a useful compromise which is generally acceptable to the Customs and Excise Authorities. A normal type of oil storage tank designed and constructed in accordance with B.S.S. 2654 should be employed, but the tank should be capable of

withstanding a gas pressure of at least 20 in. w.g. Such tanks after construction should be filled with water up to the designed level for oil. Thus as the specific gravity of the spirit is of the order of .71, an overload is applied. This is still further increased by the application of an air pressure 50% higher than the working pressure.

There must be means of measuring the volume of liquid in the tank. For operational purposes, this can be one of the pressure types, float operated, but the Customs and Excise Authority is likely to insist on a means of dipping the tank. This is best done by a dipping opening not more than 2 in. diameter, together with a suitable cap. The opening is tubed to the bottom of the tank. Thus the evaporation from it is small and even at the worst, a fire would not be very dangerous and could be handled. This dip will not be a true dip due to gas pressure, and a water gauge for measuring the gas pressure will enable the necessary connection to be made taking into account the specific gravity of the liquid.

The filling connection must be taken down to the bottom of the tank, to ensure the minimum formation of static electricity which is greatest with free falling liquids breaking up into droplets. This pipe should be submerged at all times and should therefore be lower than the outlet connection which will be on the side of an above ground tank.

Final site approval

The code issued by the Institution for the handling and storage of light distillate gives a good lead to the problem of siting the storage tanks, but the local authorities (in conjunction with the fire brigade) will have the final approval of the site. Generally speaking, at least 50 ft. will be required from any entry into the tank to a building or possible source of ignition; 75 ft. will be required to a boundary since the local authority cannot put any restrictions on the other side of the fence. A distance of 100 ft. may be asked for if the storage is close to a retort house or a boiler house.

Above ground tanks should be placed within a bund capable of holding the contents of the tank +10%, to allow for the application of foam. Drainage from the bunded area should be either manually or by manually controlled pumps. No drainage should be connected direct to the drainage system not even through an interceptor since the latter only has limited capacity which would soon be 'swamped' in the case of a tank failure.

Bunds may be of earth, concrete or any other non-combustible material. Frequently the choice of site will be related to the ability to obtain water for fire fighting purposes. Permanent foam systems may be required.

In the London County Council area, petroleum storage tanks will be required to be underground, surrounded by at least 9 in. of concrete on all sides after the tank has been pressure tested in situ. This makes an extremely expensive form of construction. The same requirements of distance will apply but no bund is required, and it is possible for the lorry standing to be very close to the tank inlet.

A definite position for a road tanker to stand when unloading should be provided. This area should be drained to one point and taken from there through a 3-pass interceptor before discharging to the drainage system. Valves associated with the flexible hoses should be locked to prevent interference. The use of half couplings incorporating shut-off valves similar to those used for l.p.g. should be considered. Unfortunately the tankers are not suitably fitted and special arrangements must be made for their use. Earthing of the vehicle together with the whole installation is essential.

Pumps will be required both for unloading from tankers, barges or other transport, into the storage tanks and from them to the plant. Suction lift is very limited, and since pumps in pits are dangerous because of the possible accumulation of heavier than air vapours, submerged pumps are required for any installation below ground. These pumps must again be installed in a tube which is normally always sealed by liquid. Pumps can then be changed with the minimum of danger since only a small surface area is involved and air is not admitted to the vapour space. Motors will be above the top of the tank and will be flameproof.

Pumps for unloading road vehicles into above ground tanks are nearly always flooded, but pumps for unloading rail tankers are not. Self priming pumps are essential; in the latter, gas and the possibility of pumping forward large volumes of air must not be overlooked. Knock-out pots (or air eliminators to give them their proper name) may be required.

Pipelines should be of welded construction as far as possible; screwed connections are not acceptable and flanges should only be used for connections to valves and meters. B.S. 1600 to 1607 give good standards for tubing and construction.

The line must be prevented from vibrating on a cyclic plant but allowance must be made for expansion. As light petroleum distillates have a high rate of expansion, liquid must never be locked up between two valves—unless a relief is provided.

The pumping rate in pipe lines should be kept below 3 ft. a second if possible, since there is no evidence of a build up of static charges below this velocity. This is not always possible, particularly when unloading from a barge or ship. Here, higher speeds can be tolerated providing (a) they do not exceed about 12 ft. a second, and (b) air is excluded from the system at an early stage.

This latter requirement is not easy to ensure, particularly where self priming pumps are used. The use of air eliminators or the use of interface detection units must be considered very carefully. They should be installed as closely to the pump outlet as is possible, but care must be taken to return carry over liquid to the pump inlet and to discharge vapours and air at a suitable point properly protected by anti-flash back equipment or flame traps.

The pipe installation must be bonded together to ensure low electrical conductivity and the whole must be earthed to prevent the build up of static charges. Valves require careful choice, particularly for tightness in the valve and around the spindle.

Careful planning needed

The actual installation within the building of, say, a water gas plant requires very careful planning. All valves and so far as possible, all pipe runs, should be clearly visible so that the first tell-tale indications of leakage can be seen and it should be someone's responsibility once per shift to look for trouble. Generally, pipes will come in above stage floor level and will fall to the plant. Meters must be chosen with care. If positive meters are required, as it is not possible to purge through most meters with steam or inert gas, they should be installed at the highest part of the line within the plant and valved off on either side with steam purges of either a permanent or temporary type installed immediately after the valves. Orifice and flowrator types of meters can usually take the purge satisfactorily.

Filters which are an essential feature if positive meters are installed, must be erected outside the building so that the cleaning process does not increase the risk of fire within the building.

GAS JOURNAL April 12, 1961

From a paper read to the London and Southern Section of the I.G.E.

The storage and handling of p.f.d. and l.p.g.

By A. G. PALMER, M.B.E., B.Sc.(ENG.), A.M.I.MECH.E., A.M.I.GAS E.,
DESIGN OFFICE MANAGER,
NORTH THAMES GAS BOARD.

IN the last five years, alternative fuels have been introduced into the gas industry at what might well be termed an alarming rate. For many years the gasworks has been a place which presented few hazards of fire and explosion in spite of the large quantity of gas handled and in few places was it necessary to restrict the use of naked lights.

Light distillates and liquid petroleum gases are now being used at an increasing rate on water gas plants for enriching and reforming, in retort houses and finally on specially designed plant for reforming at high efficiency. Thus, the gasworks is rapidly approaching the condition of an oil refinery, but an equally rigid control for safety on the works is less easily applied.

Perusal of the Petroleum Consolidation Acts 1928 shows that light petroleum distillates are within this Act, but that liquid petroleum gases are *not*, since the liquid cannot be tested in the Abel flash testing equipment.

Control of storage conditions

Thus the Petroleum Consolidation Act gives the local authority powers to apply 'such conditions to a licence to store petroleum spirit as they may deem necessary to ensure the safe keeping of petroleum spirit.' The local authority has therefore a rigid control over its conditions of storage; they can exercise it in any way they like.

L.p.g. is not within the scope of the local authority unless it is stored in close proximity to petroleum spirit, when conditions could be attached to that licence to ensure its safety.

Although l.p.g. is not governed by local authority licence this should in no way mean that the standard of safety required in its storage and use should be any less than that for petroleum spirit; on the contrary, in some respects, the standards needed may well be higher.

Light petroleum distillate is a generic term for a wide range of refinery products with a flash point well below the 73°F. referred to in the Petroleum Regulations and may even be well below 50°F. Its vapour pressure as found by the Reid equipment will usually be about 10 p.s.i., but may be 20 p.s.i., so under atmospheric conditions, it will give off vapours within the explosive range.

Losses due to evaporation will, therefore, be high. If large volumes of heavier-than-air vapour are discharged to the atmosphere, a dangerous condition can easily arise on a calm still day when the barometer is high.

Liquid petroleum gas covers butane, propane and the allied substances which are gases at normal atmospheric temperature and pressure but can be kept liquid by maintaining a pressure equal to or greater than their vapour pressure. Mixtures of them will, of course, produce vapour pressures between the values for butane and propane.

The explosive ranges in air are (a) butane, 1.6% to 8.5%, and (b) propane 2.4% to 9.5%. The great feature of the gases is their very high specific gravities (air=1) which are (a) butane 1.90 to 2.10, and (b) propane 1.40 to 1.55.

There is, therefore, a marked tendency for these gases to fall to the ground and flow along its contours until dispersion or diffusion takes place, which makes them markedly different from the gases which the industry is used to handling; a fact which must be made known to all persons concerned with storage and handling.

It is most important to emphasise that the whole design and operation of the plant and equipment to be used for light distillates and l.p.g. must be to such a standard that no leakage, however small, is tolerated. The tell-tale signs of dampness—with distillates—or of snow—with l.p.g.—must be attended to immediately, since they can soon result in a dangerous condition particularly inside a building.

In this paper, reference will only be made to the storage of l.p.g. in pressure containers, and not to refrigerated storage which, though not yet in vogue, is likely to come before long.

Generally speaking, light petroleum distillate can be stored at atmospheric pressure in normal oil storage tanks. It can, however, have such a high vapour pressure as to necessitate storage in pressure spheres or containers, but since this high vapour pressure material is not in general use no special reference will be made to it. It is, however, sufficient to say that such storage is very similar to the storage for l.p.g. but at rather lower pressures.

High evaporation

With the high evaporation of the liquid, it is preferable to store light petroleum distillate in tanks which are vented to the gas stream; thus the calorific value of the vapour can be usefully employed and possible danger avoided. Unfortunately, this practice is rather at variance with the Customs and Excise Authorities, since such material is only duty free providing it is reformed into non-dutiable gases and oils. The Customs and Excise Authorities, however, appreciate the benefits of keeping the vapours within the plant, but must of necessity, press for action to be taken to reduce the volume of these vapours to a minimum.

Operating the tank within a range of pressures is a useful compromise which is generally acceptable to the Customs and Excise Authorities. A normal type of oil storage tank designed and constructed in accordance with B.S.S. 2654 should be employed, but the tank should be capable of

withstanding a gas pressure of at least 20 in. w.g. Such tanks after construction should be filled with water up to the designed level for oil. Thus as the specific gravity of the spirit is of the order of .71, an overload is applied. This is still further increased by the application of an air pressure 50% higher than the working pressure.

There must be means of measuring the volume of liquid in the tank. For operational purposes, this can be one of the pressure types, float operated, but the Customs and Excise Authority is likely to insist on a means of dipping the tank. This is best done by a dipping opening not more than 2 in. diameter, together with a suitable cap. The opening is tubed to the bottom of the tank. Thus the evaporation from it is small and even at the worst, a fire would not be very dangerous and could be handled. This dip will not be a true dip due to gas pressure, and a water gauge for measuring the gas pressure will enable the necessary connection to be made taking into account the specific gravity of the liquid.

The filling connection must be taken down to the bottom of the tank, to ensure the minimum formation of static electricity which is greatest with free falling liquids breaking up into droplets. This pipe should be submerged at all times and should therefore be lower than the outlet connection which will be on the side of an above ground tank.

Final site approval

The code issued by the Institution for the handling and storage of light distillate gives a good lead to the problem of siting the storage tanks, but the local authorities (in conjunction with the fire brigade) will have the final approval of the site. Generally speaking, at least 50 ft. will be required from any entry into the tank to a building or possible source of ignition; 75 ft. will be required to a boundary since the local authority cannot put any restrictions on the other side of the fence. A distance of 100 ft. may be asked for if the storage is close to a retort house or a boiler house.

Above ground tanks should be placed within a bund capable of holding the contents of the tank +10%, to allow for the application of foam. Drainage from the bunded area should be either manually or by manually controlled pumps. No drainage should be connected direct to the drainage system not even through an interceptor since the latter only has limited capacity which would soon be 'swamped' in the case of a tank failure.

Bunds may be of earth, concrete or any other non-combustible material. Frequently the choice of site will be related to the ability to obtain water for fire fighting purposes. Permanent foam systems may be required.

In the London County Council area, petroleum storage tanks will be required to be underground, surrounded by at least 9 in. of concrete on all sides after the tank has been pressure tested in situ. This makes an extremely expensive form of construction. The same requirements of distance will apply but no bund is required, and it is possible for the lorry standing to be very close to the tank inlet.

A definite position for a road tanker to stand when unloading should be provided. This area should be drained to one point and taken from there through a 3-pass interceptor before discharging to the drainage system. Valves associated with the flexible hoses should be locked to prevent interference. The use of half couplings incorporating shut-off valves similar to those used for l.p.g. should be considered. Unfortunately the tankers are not suitably fitted and special arrangements must be made for their use. Earthing of the vehicle together with the whole installation is essential.

Pumps will be required both for unloading from tankers, barges or other transport, into the storage tanks and from them to the plant. Suction lift is very limited, and since pumps in pits are dangerous because of the possible accumulation of heavier than air vapours, submerged pumps are required for any installation below ground. These pumps must again be installed in a tube which is normally always sealed by liquid. Pumps can then be changed with the minimum of danger since only a small surface area is involved and air is not admitted to the vapour space. Motors will be above the top of the tank and will be flameproof.

Pumps for unloading road vehicles into above ground tanks are nearly always flooded, but pumps for unloading rail tankers are not. Self priming pumps are essential; in the latter, gas and the possibility of pumping forward large volumes of air must not be overlooked. Knock-out pots (or air eliminators to give them their proper name) may be required.

Pipelines should be of welded construction as far as possible; screwed connections are not acceptable and flanges should only be used for connections to valves and meters. B.S. 1600 to 1607 give good standards for tubing and construction.

The line must be prevented from vibrating on a cyclic plant but allowance must be made for expansion. As light petroleum distillates have a high rate of expansion, liquid must never be locked up between two valves—unless a relief is provided.

The pumping rate in pipe lines should be kept below 3 ft. a second if possible, since there is no evidence of a build up of static charges below this velocity. This is not always possible, particularly when unloading from a barge or ship. Here, higher speeds can be tolerated providing (a) they do not exceed about 12 ft. a second, and (b) air is excluded from the system at an early stage.

This latter requirement is not easy to ensure, particularly where self priming pumps are used. The use of air eliminators or the use of interface detection units must be considered very carefully. They should be installed as closely to the pump outlet as is possible, but care must be taken to return carry over liquid to the pump inlet and to discharge vapours and air at a suitable point properly protected by anti-flash back equipment or flame traps.

The pipe installation must be bonded together to ensure low electrical conductivity and the whole must be earthed to prevent the build up of static charges. Valves require careful choice, particularly for tightness in the valve and around the spindle.

Careful planning needed

The actual installation within the building of, say, a water gas plant requires very careful planning. All valves and so far as possible, all pipe runs, should be clearly visible so that the first tell-tale indications of leakage can be seen and it should be someone's responsibility once per shift to look for trouble. Generally, pipes will come in above stage floor level and will fall to the plant. Meters must be chosen with care. If positive meters are required, as it is not possible to purge through most meters with steam or inert gas, they should be installed at the highest part of the line within the plant and valved off on either side with steam purges of either a permanent or temporary type installed immediately after the valves. Orifice and flowrator types of meters can usually take the purge satisfactorily.

Filters which are an essential feature if positive meters are installed, must be erected outside the building so that the cleaning process does not increase the risk of fire within the building.

On a plant it is essential to have a secure means of isolating these dangerous materials from the plant so that normal maintenance can take place in safety.

Perhaps the greatest operational difficulty experienced is the finding of air within a tank under gas pressure. This occurs even with pumps incapable of pumping gas and arises from two sources:

1. The trapping of air in the flexible hoses between the vehicle being unloaded and the first valve which is holding back spirit. This can be reduced and probably even obviated by arranging a vertical standpipe higher than the top of the tanker being unloaded and venting the air before commencing to pump. Such a standpipe must be shut off or air will be entrained in the liquid.

2. The entrainment of air with liquid particularly at the end of the pumping. At this stage, the pump will be handling a mixture of liquid and air. This can be partially controlled by reducing the pumping rate by control of the pump outlet valve or by the use of air eliminators. So far air eliminators have not been found essential.

Positive isolation

In the connections to a plant, as has already been mentioned, positive isolation to ensure no entry of dangerous liquids into the plant is essential. To purge the lines properly it is preferable to operate a cyclic plant with the distillate valves shut off and the steam purge on for the last three or four cycles. There must be a carefully prepared 'drill', and it must be adopted whenever the plant has to be shut down for periods longer than a few minutes.

The storage tanks for liquid petroleum gases are pressure vessels working at either 100 p.s.i. or 225 p.s.i., and may be either cylindrical or of spherical welded construction, the latter method being only applicable to large volumes of storage. Tank design must be carefully considered and the insurance company's advice on this point is worth having. If the cylindrical tanks have a big enough diameter, internal staying will be necessary, particularly for the condition when the tank is about two thirds full with water for the hydraulic test. Cylindrical tanks should preferably be fitted with two large size manholes capable of taking all or almost all of the fittings required.

Cradles for mounting the tanks on concrete pads must be welded to the tanks to avoid corrosion between the tank and the cradle. The use of a light reflecting paint is recommended so as to keep down the temperature of the liquid as much as possible. All tanks shall be effectively bonded to earth.

Tank fittings principally consist of relief valves. The size and quantity of these can be determined satisfactorily from the data provided by the American Bureau of Fire Underwriters.

The size of relief valves is determined by the rate of heat input into the tank during the fire. Opinions vary considerably on this, so also do they on the design of cooling systems and on recommended safety valve areas. Generally speaking, 20 to 30,000 B.t.u. per sq.ft. per hour appears a reasonable compromise and this is much in line with American thought on the subject. Relief valves are usually based on a heat input of 6,000 B.t.u. per sq.ft. per hour. Water cooling is required to keep the heat input down to this figure.

Unfortunately, safety valves are seldom really tight. It has been found preferable to use a number of small size safety valves mounted on a manifold with interlock valves so arranged, that one valve out of four can be removed for maintenance purposes while the tank is still under pressure.

This is a useful asset and is perfectly safe to use. Some of the safety valves should discharge to a gas stream to avoid the vapour passing to the atmosphere, and should be set to lift before the remaining valves which should discharge to the atmosphere only in an emergency. Any discharge to the atmosphere should not be less than 6 ft above the tanks and the outlets should be fitted with blow-off type of rain hoods.

Inlet connections should again be taken to the bottom of the tank but it is preferable that there should be no other connections from here. All such connections, except relief valves, must be fitted either with excess flow valves on all outlet lines or non-return valves on all inlet lines, to ensure that the fracture of a line does not result in the discharge of the tank.

The measurement of volume is not easy. Cylindrical tanks generally do not justify the pressure type of float and tape. Measurement by dips through a specially designed valve can be achieved, but the simplest method is the swing arm fitted on the centre of one of the domed ends and used to find the liquid level.

Water sprays for keeping down the temperature of the liquid as well as for absorbing radiant heat in the event of a fire must be installed. A well known fire equipment firm have measured the rate of heat input when a tank is surrounded with fire and have found the volume of water required to keep the temperature of the l.p.g. low enough to allow the safety valves to pass the gas generated without causing an excess pressure rise. This is calculated as 0.20 gal. per sq.ft. per minute. By splitting tank installations up into single or double units, it is just about feasible in some cases. If on the other hand the spillage of l.p.g. is drained away from the tanks, then the rate of heat input is reduced and the volume of water required is also reduced. On this basis the application of water more generally adopted is .025 to .030 gal. per sq.ft. per minute. Preferably this should be automatically applied but if reasonable supervision is available, manual control is acceptable.

Although the choice of site is not governed by the terms of a licence granted by the local authority, it must be remembered that this pressure container could do a vast amount of damage if it exploded. Similar conditions to those required by the Local Authority for petroleum spirit should therefore be adopted with one additional requirement, which is that any liquid from a fault of any kind, must be prevented from entering any drainage system. Here it would rapidly vaporise with possibly disastrous results.

Fire fighting problems

Fire fighting is difficult. Foam is broken by the pressure of vapour from the liquid. In small fires water fog, dry powder or steam are preferable. The latter is almost a standard among the oil companies. On bigger fires there is little hope of extinguishing it. In fact, to do so might be even more dangerous than the fire, as large volumes of very much heavier than air vapour would flow across the ground considerable distances in calm weather. Some American sources in consequence recommend a source of ignition around the bund to avoid that possibility. It is a thought, but not one to take up lightly.

A definite 'stand' should be provided for the road vehicle delivering l.p.g. This should take the form of a collecting area with a capacity equal to that of the tanker. It must not be connected to the drainage system but a collecting sump can be very useful. Failure of flexible hoses are not unknown in spite of precautions to prevent such a happening.

For pumps used for l.p.g., mechanical seals are the only really satisfactory shaft seal, although fluon impregnated

asbestos packing is useful on pumps running at speeds up to 1,500 r.p.m. Perhaps the greatest danger when pumping, is the possibility of vaporisation in the eye of the impeller caused by the pressure falling below the vapour pressure; a 'plus head' over and above the vapour pressure must then be applied. There are two ways of doing this:

1. Raising the tanks by choosing high level ground, or by mounting them on tall pads.

2. By raising the pressure in the tanks by increased gas pressure. Although this requires a gas compressor, among the advantages to be gained is that a constant pressure can be maintained at the plant end of the pressure line, irrespective of the vapour pressure in winter and summer. The pump, however, must be chosen to ensure under all circumstances a pressure at the end of the system greater than the vapour pressure to prevent trouble caused by vapour locking.

Pipelines again must be of all welded construction so far as is possible. They should be subjected to twice the working pressure hydraulically and then to a standing air test at working pressure for a least 24 hours. All pipework should be constructed to B.S. 1600 to 1607.

Where vaporisers are used, there must be careful planning to ensure safe operation. Cut off devices must be fitted so that steam is turned on before l.p.g. can flow; the level in the evaporator is prevented from increasing too much and become a danger to the vapour outlet; air (if used as the diluent) can only be added when l.p.g. is flowing. Safety valves must be fitted to prevent an excess pressure occurring in the vaporiser.

The site for vaporising units should be surrounded by a low bund to prevent outflow and yet not high enough to prevent wind sweeping off the compound. It should be enclosed in a fence to prevent unauthorised persons from entering the area.

DISCUSSION

Mr. T. A. Canning, S.E.G.B., Beckenham, asked Mr. Palmer whether he would expand upon the question of air eliminators. He questioned the pumping rate stated by Mr. Palmer as being very high; when handling a clean petroleum product, there was a definite velocity above which static electricity charges would be built up. This had been stipulated as being 3 ft. a second, while Mr. Palmer had given 12 ft. a second as the velocity employed.

He advocated a shorter run of pipe in the buildings housing c.w.g. plants, and for shut-off valves. A leakage of liquid released a very large volume of inflammable gases when it met the air. A small proportion might cause an explosion.

No attempt should be made to extinguish butane fires with water, but only to cool and protect the other tanks, to isolate the leak and let it burn itself out. There was little to be gained from igniting a leak. Its presence was indicated by a fog or mist, and such a leak could frequently spread until it reached an ignition source. He advocated the employment of fog nozzles on fire hoses to isolate the leakage.

The use of a colour code that was easily recognisable was a sound way of familiarising the operators with each distinct connection. Workers near the plant should be warned against wearing clothes made from nylon or Terylene, which could melt and cause serious burns, and accumulate static charges. Operators should not wear rubber footwear or any that were non-conducting; leather was quite all right, but there must not be any metal tips or nails in the shoes. It was important to earth tankers, and ensure that there was good bonding between them and the tanks.

Whatever safety measures might be taken, there was no substitute for good design and first class operation.

Mr. Palmer, replying, said that Mr. Canning had filled in the gaps he had left. He still put filling pipes on top of the tanks, although in this he might be old-fashioned.

He supported the suggestion that there should be two foam control units; if there was an intense fire, it was essential to get the foam on the right side of the wind. They had not used air eliminators.

They used a pumping rate of 12 ft. a second. This might be increased given clean conditions, but they seldom got these conditions. This figure appeared to be the commencement of the sharp rise in static electricity. He agreed that the short run of piping was preferable, and supported the use of shut-off valves to keep the liquid from the buildings. Shut-down valves must be used on inlet pipes. If such a thing as a crane fractured a pipe, there must be a control on the plant to stop the pumping.

There was no one way of protecting against fire. The oil industry was very keen on steam, and for minor leaks this was good; it was wise to slap on a poultice. If the leak was of any size at all, it was far safer to let it burn, for there had been cases of vapours travelling a very long way.

Water sprays were very useful in particular circumstances, especially to get at valves involved in a fire. P.f.d. or light distillate pipes should be of especially distinctive colours, so that operators might be sure what to shut down in emergency.

He had never been very strong on the matter of nylon and Terylene causing a static charge, but he agreed that by it melting, it could be very serious, and this had caused much injury in fire fighting in the past.

Upon the bonding of tankers, he said that any installations should be bonded throughout, and this included the vehicles.

Mr. J. Nixon, H.M. Inspector of Factories, said that this paper dealt with new materials, and it was the first time anyone had tried to collect information on the storage of p.f.d. and l.p.g. He had found that the use of town gas in the vapour space of tanks not only conserved the losses which might occur from vaporisation but avoided inflammable concentrations in this space.

They were at first worried by the new plants, since had there been the same conditions prevailing that they had seen in water gas plants, they would have felt that there would shortly have been several less plants to worry about.

With regard to l.p.g. there had been no specific legislation, and they had been asked on several occasions for advice on installations for the gas industry.

He pressed for the standards in N.F.P. codes 58 to 59 as the safety distances for l.p.g. Code 58 contained a table giving the figure of 50 ft. for plants over 4½ tons, but stopped at these. Code 59 gave figures suitable for l.p.g. in plants equivalent to those of the gas industry's scale.

The distances here were much greater than the magical 50 ft., and far greater distances should be maintained than this figure; but no gasworks had the space. With regard to the natural ventilation area round the tanks, there should be some containment of residual liquid and a very low wall some distance from the tank. The wall must not interfere with the ventilation under the tanks.

The codes specified up to 200 ft. for big installations, but these were not concerned with major leaks. The standard for the installation described in the paper was very high; he was very pleased with the complete welded construction.

The danger from external fire was a major one. Using pressure vessels and having no air entrainment, it was

essential to have no inflammable matter in the near distance. Spent oxide and storage boxes should be kept well away on the other side of the works. With a small fire it was possible to snuff it out, but a big one must be allowed to burn out; the amount that could be involved was remarkable. Vaporisers should be kept out of the storage area, but a long run of pipe should be avoided.

Mr. Palmer replied that at first the petroleum officers had wanted them to enclose exhaust valves in boxes, but they had settled that and showed them how tight they could keep valves. With regard to distances, the figures he gave would apply to most installations, but he had left out the bigger ones. It was wise to keep the vaporisers apart, but not too far. His practice was to take the liquid across the works and bring it as close to the vaporiser as possible.

Mr. J. T. Veryard, S.E.G.B., Croydon, said that in the use of both light distillate and l.p. gases no leakage, however slight, could be tolerated. In the South Eastern Gas Board if any such leakage was found, immediate steps must be taken to stop it by isolating the section, followed by draining it into closeable containers, purging and repair. Referring to the filling of storage tanks, he agreed that a freely falling liquid discharge was to be avoided, but it was doubtful whether filling through the roof of a storage tank with a connection to the bottom had any advantage to filling at the bottom for above-ground storage tanks. It was possible to have air trapped in a connection passing down through a top filling connection, and remembering that the velocities should not exceed 3 ft. per second, the generation of static electrical charges was still possible.

The entrainment of air when stripping out a road or rail tank had always been regarded with some apprehension, but if the storage tank was vented to atmosphere, the air added no greater hazard than that already in existence. Any air pumped into the tank was likely to become saturated with light distillate, so normally the vapour concentration was above the upper inflammability limit, except for those distillates of relatively high boiling range—s.g. above .7—when air saturated below about 50°F. became within the limits of inflammability.

If the storage tank were gas sealed the atmosphere above the liquid was likely to contain hydrogen with a wider range of explosive limits than light distillate—coal gas 5 to 30%, water gas 6 to 55%, compared with light distillate 1.5 to 9%—and then air eliminators should be installed on the filling line.

Mr. Veryard failed to see the advantages to be gained by draining the area containing the tanks to a collecting sump. Any slight leakage likely to be encountered in a soundly engineered job was certain to vaporise immediately and even if allowed to persist was not likely to reach a sump, 30 ft. away. Any leak of such magnitude that liquid butane could accumulate to the extent of the capacity of one tank would be a catastrophe for which there could be no adequate safeguard. If the vapour ignited, the flame would flash back to the source of leakage, and he could not see what advantage the sump would provide. The real answer to the problem of a major leak of liquid is that it should not be allowed to occur.

To avoid the possibility of corrosion in storage tanks pressurised by coal gas for feeding pumps conveying l.p.g. in the liquid state to the vaporisers, a process attended by many difficulties, the South Eastern Gas Board installations use flow by gravity which, with adequate excess flow devices, was considered better than a pumped supply.

Mr. Palmer replied that he disagreed with the maximum velocity of liquid l.p.g. of 3 ft. a second in the pipe at the top of a storage tank. With such a pipe there was a free fall, though perhaps 3 ft. a second might be the limiting velocity until the inlet pipe was submerged.

He preferred to vent the tanks to a gas stream to ventin them to air; but unless one started off right, there migh be difficulty in maintaining it. The air coming out o solution in the tank was probably insufficient to cause a explosive mixture.

He personally was thinking of the tanks that had *no* failed. It was important to get the burning matter awa from the other tanks, so that the end of the tank only wa exposed to radiant heat; otherwise there was a risk o getting it under the tanks. He agreed that the ideal wa that there should be no leakage.

He was surprised that coal gas should cause corrosion and he had found no sign of it even after four or five years' working. In fact a recent inspection had revealed no corrosion whatever.

With regard to gravity flow instead of a pumped supply, he thought that if the lines were not gas loaded they were likely to suffer from low pressure and gas locks.

Mr. W. T. J. Gedge, E.G.B., Chingford, said that there was difficulty in understanding the regulations and satisfying the varying opinions of the local petroleum officers. Mr. Palmer's paper was a handbook for the future. They had tried to conform and provide the right distances between the tanks and the plant, but Mr. Nixon thought these should have been even greater.

The petroleum officers had set figures for water cooling, when fires occurred near tanks, that were very difficult to meet. It was time they all got together and decided on the best conditions to be adopted; at the moment one authority contradicted the other.

He had installed quite a number of tanks; the first in 1959, for enrichment of c.w.g. by p.f.d. in a densely populated area. They had to put them underground; the six tanks were each 40 ft. long by 12 ft. diameter and they had been concreted into one big hole. It had been a little costly, but simpler than above ground tanks; it had been a much better job, and he questioned whether it was ultimately so much more expensive.

The installation had been constructed with the best possible materials. The piping had been seamless to B.S. 1604, 1950 for high temperature steel in case of fire. All joints had been tested by gamma rays. The plant had been working for two years and there had been no leakage at all so far.

As regards the dipping of tanks, they dipped to get the approximate position, chalked the dip-stick, then re-dipped; there was a clear indication of the correct reading on the chalk. They had gauged how much the oil would creep up, and they allowed 1/10 in. for these tanks.

When they had wanted to vent the tanks into the gas stream, the petroleum officer had made them fit foam pourers into the tank; but if the gas mixture was in the free space at the top of the tank, there would never be a fire and the foam pourers and the other gear would never be used.

There had not been very much about tanks for propane storage in the paper. His Board had specified that such tanks should be able to withstand 275 p.s.i. with a working pressure of 250 p.s.i.; a class 1 B.S. 1500 specification steel had been used.

Propane was very cold even at atmospheric pressure. The steel used must therefore be able to withstand this; the plates should be of carbon steel of 150/151 Grade C and stress relieved down to −20°C. This was only suitable for tanks needing plates up to 1¼ in. thick; if they were required to be thicker BS 1501/LTO was needed, which would allow as low a temperature, but were impact tested as well. Tanks were however being made of a steel not suitable for these low temperatures.

He did not understand how the liquid could be run off into the runaway area in the case of fire or how the liquid

would be got rid of. If there was a major leak, and the propane did not burn, everyone nearby would be unconscious, because propane was an anesthetic.

He asked whether Mr. Palmer favoured any particular valve, and whether the one with the asbestos packing was really superior.

Mr. Palmer replied that he was bound to defend Mr. Nixon, who was a factory inspector and not responsible for petroleum personnel; he agreed that the opinions of local authorities did differ widely.

Below-ground storage was very good for small quantities; but for ½ mill. gal. storage tanks something different was needed. On the matter of dipping the tanks, he dismissed creep values as inaccurate; they would be worried if that 1/10-in. value were right.

Mr. J. M. E. W. Webber, S.E.G.B., Brighton, said that they had a compound with a sump at one end; in Sussex they were very sump-minded.

He illustrated his argument by imagining two 1-ft. squares of celluloid, joined by a 1-in. wide strip of celluloid. The first square was the tank, the second was the sump, and the strip of celluloid represented the river of liquid that had leaked from the tank. If one square was lit, the fire would run along the strip and ignite the other. But he thought that a fire under one tank, with a leak running across, would burn itself out, if the leak was not too big, if it was a major fire, however, it would still be 30, 40 or even 50 ft. away; he would rather have it there.

He had noticed the flat surfaces in the plant illustrated in the paper; with such surfaces, a leaking liquid would spread, and since the concrete was warm in relation to the escaping butane, the liquid would all vaporise. The local authority was not worried about liquid butane catching fire, but they were scared stiff of burning vapour, and he quoted an instance in America when there had been a flashback over a distance of two miles. He said they had gullies around the tanks, for the liquid butane to run into, so there would be the minimum of vaporisation, and all liquid could then be taken away to the sump.

He said that he had had his faith in air eliminators shaken. According to the diagrams they worked beautifully, but if the manufacturers were asked what would happen if there was too much air for the spout to deal with, and excess air was to be got rid of, they merely recommended a bigger and much more costly instrument that was certain of being able to cope with the volumes involved. The really positive eliminators were very big and very costly; however, he regarded them all with suspicion.

With regard to foam pourers, accidents were usually due to well relied-on safety devices failing. A feed pipe might be put out of action, and it only needed another little fault, and a tank might cease to be gas-pressurised, with the result that its contents became a matter of surmise.

Mr. Palmer said that he thought the idea of gullies around the tanks was intriguing and worth looking into. He agreed with Mr. Webber over air eliminators, and said that he did not really trust them.

He disagreed on the causes of accidents however; it was usually one simple factor which failed and caused the accident. Foam pourers reduced the risk, and might be worthwhile; but they were no good if the tank split. If there was a fire in the tank, they were very useful, but such a fire was not very likely.

Mr. R. F. Hayman, Gas Council, in a written contribution, drew attention to the future sales of l.p.g. being a considerable competitor to sales of industrial gas. L.p.g. was offered at anything from 11d. to 1s. 3d. per therm—and even lower figures had been quoted—and this meant that in large areas, notably in the south of England, where the price of gas was usually higher, some 40 mill. therms of the gas industry's load was threatened. Thus any problems of storage in consumers' premises were factors of which they should take note. It was most important to impress upon their consumers much more forcibly than they had done hitherto that the relative price of fuels in the case of gas versus l.p.g. was by no means the only factor.

Referring to there being no regulations governing the storage of l.p.g., he pointed out that from a study of the two American documents Nos. 58 and 59 of the National Fire Protection Association, it seemed that the standard laid down was being relaxed. For instance, the Americans suggested a minimum of 50-ft. clearance from buildings for storage tanks above 2,000 gal. water capacity, but English Codes suggested that this distance was only necessary for tanks of 5,000 gal. upwards. Again the Americans suggested a maximum size for all ground storage tanks in consumers' premises of 30,000 U.S. gal. (water volume), but no mention was made of a maximum size in any English document.

BOOK REVIEW

1956 BIBLIOGRAPHIC SURVEY OF CORROSION

Compiled by Nicole Treves Atlas.

A COLLECTION of 2,136 abstracts of technical literature published during 1956 in numerous world periodicals and included in the 1956 Bibliographic Survey of Corrosion, relate to articles, books and pamphlets on corrosion and corrosion control.

Also included are abstracts of material published in earlier years not previously included in bibliographies.

Abstracts used have been selected from those prepared by 31 agencies which have authorised the American National Association of Corrosion Engineers to use their abstracts.

Abstracts are arranged in the book according to their principal content as classified under the N.A.C.E. Abstract Filing Index. In this index the literature is classified under eight main headings: General, testing, characteristic corrosion phenomena, corrosive environments, preventive measures, materials of construction, equipment and industries. Each of these groups is further subdivided.

Each of the subject categories into which the abstracts are grouped is cross-indexed. An extensive subject index is largely supplementary to the cross-indexing, providing access to the data through many metals and alloys by trade names, specific properties and behaviour in specific media.

The author index lists 2,859 names. Referencing is to page and abstract on the page by number. An appendix gives information to assist users in obtaining copies of articles in which they are interested.

This is the seventh in a series of N.A.C.E. bibliographies on corrosion control literature covering the period 1945-56. A total of 22,181 abstracts is included in all volumes.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, HOUSTON, TEXAS, U.S.A.

PRICE: Non-members $27.50; members N.A.C.E., $22.50.

Technical developments AT THE IDEAL HOME

Stoves' Cabaret

THE Newhome Cabaret cooker has an extra large eye-level grill which is capable of holding six chops at one time.

The Cabaret is a medium-sized cooker, and has four self-lighting hotplate burners with push-in safety taps, and

a roomy oven. The heat of the oven is controlled by an Autocook thermostat, and the multi-spring sealed door ensures that there is no loss of heat. To make the cleaning of the oven easier, it has rounded corners.

There is a large storage cabinet which is fitted with a drop down door beneath the oven.

The Cabaret is finished in cream or white vitreous enamel, and can be supplied with a facia panel coloured ice blue, regal red or silver chrome.

The cooker is 56 in. high, 20 in. wide, and 20½ in. deep. Its price is £30 19s. 6d.—*Stoves Ltd.*

Sugg's Regia heater

THE Regia room heater combines warmth from the glowing radiants, and convected warm air from the all-over pattern front grille.

The control tap and flash igniter are placed on top of the heater, easily visible and needing no stooping.

The tap is graduated to give a choice of four heating positions, saving gas and giving great heat control whatever the weather.

The Regia's height (excluding the tap) is 27¼ in., its

width is 22½ in. Its depth at the top is 7 in. and at the base 5¼ in. The height to the top of the flue spigot is 19½ in.

The gas rate of this room heater is 18,000 B.t.u. an hour. It is finished in regal red, old gold, charcoal lustre, or pastel blue, and has a silver-gilt grille and chromium plated trim.—*William Sugg & Co. Ltd.*

Radiation New World 44

ONE of the features of the New World 44 cooker is the Sola grill, which provides balanced heat whether at the super, fast or normal setting of the three-heat control tap. It is pre-set to regulate the heat required for the full range of toasting and grilling operations.

The hotplate is fitted with detachable stainless steel rods, easily removable for cleaning purposes. Pans can be moved easily across the surface by sliding instead of lifting.

This use of stainless steel for gas cookers is not a new venture. Just a year ago, Radiation introduced it on the hotplate of the New World 33 cooker.

The success of this model has led to the continuation of the stainless steel development in the New World 44. Retail price is £44 10s.—*Radiation New World Ltd.*

Flavel Equerry

THE Flavel Equerry is of a completely new design. It has a high level grill with an extra-large grilling surface, and a platerack is incorporated in the canopy of the grill assembly.

The chromium-plated grill shelf is removable for easy cleaning.

The large grill pan is manufactured from anodised metal and is fitted with a coloured plastic handle which matches the ultra-modern cooker control taps.

The hotplate is designed to give extra stability for maximum safety in the home; the top bars, finished in armour lustre, are interchangeable and the four burners, two quick and two medium boiling, are ignited instantly at the turn of the ' push-turn ' safety taps.

The large oven will hold a 25 lb. turkey; it is finished in

a blue light-reflecting finish, and has a swing-down roof for easy cleaning.

The oven door, which is opened by a push-button situated in the centre of a two-way handle of contemporary design, is fitted with studs so that the Flavel handyrack, supplied as an extra, may be fitted.

The oven is thermostatically controlled, and cooked foods can be kept warm for a long time without drying up by turning the control knob to the warm position.

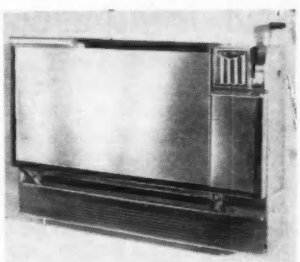
Beneath the oven is a large storage compartment with drop-down door.

The Flavel Equerry is finished in cream or white vitreous enamel with a choice of six tap colours: Blue, red, orange, green, ivory and black. The retail price of the Equerry is £37 10s.—*Sidney Flavel & Co. Ltd.*

Cannon (GA)

ROTISSERIE

THE Cannon Super-Chef rotisserie grill is now available as a complete independent unit that can be fixed in any convenient position on the wall or to any cabinet top.

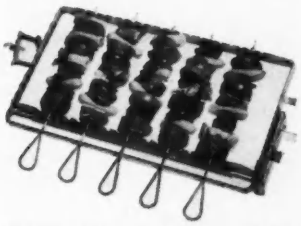


This independent unit brings real roasting within the reach of every housewife, no matter how new her cooking equipment may be. The SuperChef supplements and completes the existing cooker.

KEBAB

The Cannon kebab is designed for use with the SuperChef rotisserie grill either on the A133 cooker or as an independent unit.

It provides kebab skewers (rotated by the rotisserie



motor), on which a wide variety of assorted foods may be grilled.

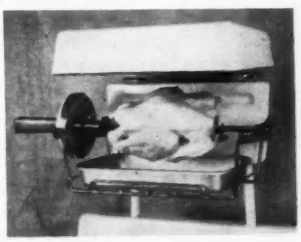
One may cook all meats, kidneys, bacon, sausage, mushrooms, chicken sections, rabbit, fruit, fish, shrimp, prawn, shellfish etc., on a skewer.—*Cannon (GA) Ltd.*

Parkinson Peeress

THE Parkinson Cowan Peeress gas cooker offers a spit roaster as an optional extra for converting the high level grill quickly and easily.

The spit roaster, driven by an easily wound motor so there are no extra connections to make, will rotate continuously for an hour and a quarter carrying a 3-lb. chicken or joint of meat.

The normal platerack is lifted off and replaced by a



special rack to carry the roasting tin. The spit itself then rests across the support arms.

The price of the spit roaster if bought with the Peeress is £5 14s. 2d., and if purchased separately is £5 14s. 2d. plus 11s. 10d. purchase tax.—*Parkinson Cowan Ltd.*

Electrolux refrigerators

L.40

THE Electrolux L.40 refrigerator has 8 sq.ft. of shelf area and a capacity of 4 cu.ft.; its low temperature compartment holds 7 lb. of frozen food—most types of which it can keep safely for at least three weeks.

Ice can be made in the compartment in two ice-trays which provide 1 lb. 5 oz. of ice. Below the compartment is a cold tray for storing uncooked meat and fish. There is a full-width vegetable drawer which can easily be removed to a work table while food is being prepared.

The door of the L.40 has two compartments for butter and cheese. Three adjustable shelves accommodate bottles, small packets, tins and eggs—and milk and wine bottles can be stored on the lower shelf. All shelves can be removed quickly for cleaning.

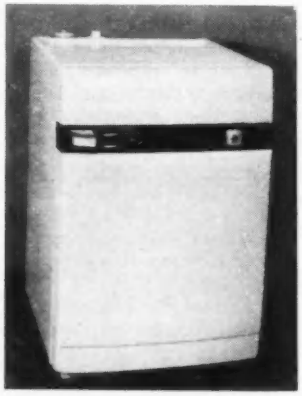
An optional extra for the L.40 is a specially designed TrayTop, to provide an additional working surface and a colourful tray for carrying food.

The Electrolux L.40 measures 36 in. high, 22⅞ in. wide and 24½ in. deep and weighs 125 lb. It is finished in either white or cream with ice-blue and gold colour trim, and costs 59 guineas.

DE LUXE 26

The Electrolux de luxe 26 has 5½ sq.ft. of shelf space, 2.6 cu.ft. capacity and low temperature storage for up to 3¼ lb. of most types of frozen food. For ice-making there are three trays—one with a quick release handle.

The de luxe 26 has a top interior shelf which will hold six standard size pint bottles of milk and is reversible to



provide storage for taller bottles. The door has four shelves —one serves as an egg rack—all of which can be removed easily for cleaning.

It is available in white or cream enamel with colour decoration in ice-blue and gold, and measures 31⅞ in. high, 20¼ in. wide and 23¼ in. deep and weighs 96 lb. This model costs 47 guineas.

THE SIXTEEN

Styled specially for smaller kitchens and smaller household budgets, the Electrolux Sixteen can be put on a cabinet, hung on a wall or mounted on a stand. It has 3¼ sq.ft. of shelf area and 1½ cu.ft. capacity, and two removable door shelves for bottles, butter and eggs; 2 lb. of frozen food can be stored in the ice compartment which normally holds an ice tray.

Each model is supplied complete with a wall bracket which can be secured easily to a suitable wall by three screws set in bolts or plugs. The refrigerator simply hangs from the bracket.

The Sixteen costs 31 guineas.

Finished in white high gloss enamel, the Sixteen measures 23 in. high, 19½ in. wide and 21 in. deep and weighs 54 lb.—*Electrolux Ltd.*

Radiation Parkray

PARKRAY 60

RADIATION'S slim-line Parkray 60 room heater with back boiler projects only 5 in. into the hearth.

It provides, at low fuel consumption, radiant heat and convected warm air for heating rooms up to 1,900 cu.ft. capacity, and hot water for the average household. This appliance is suitable for new installations or as a modern replacement for existing 16-in. or 18-in back boiler fires.

Alternatively, the boiler output (10,000 B.t.u. per hour) can be used to heat 40 sq.ft. of radiator surface (two radiators and a towel rail). Heat resistant glass permits a clear view of the fire when the firedoors are closed.

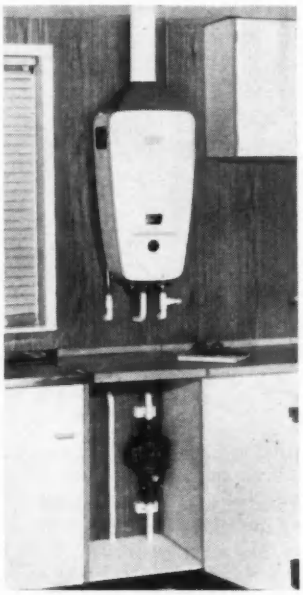
The Parkray 60 is available in six colours: Stone mottle, fawn mottle, grey velvet, mushroom, bronze lustre and black lustre. Its price is from £31 7s. 6d.

PARKRAY G. 604

The compact Parkray G. 604 gas-fired central heating unit fits easily on the kitchen wall to save valuable floor space. Its electric accelerator pump can be accommodated out of the way in a cupboard below.

Designed for small pipe systems using conventional column or skirting type radiators, 'fanned' warm air convectors or floor heating coils, the unit will provide full central heating throughout a three-bedroom house or bungalow.

Price of the Parkray G. 604, complete with accelerator



pump and low voltage electrical controls, is £93. A typical installation in an average three-bedroom house (seven or eight radiators) would cost about £350.—*Radiation Parkray Ltd.*

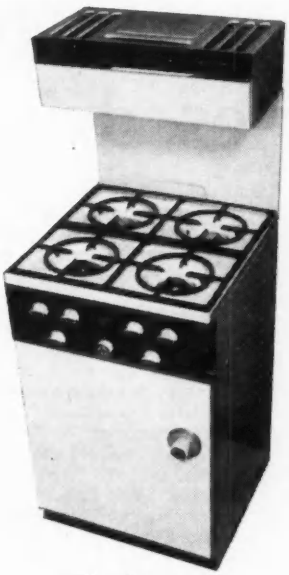
Allied Ironfounders

LEISURE 60

THE Leisure 60 cooker is finished in eight new colour combinations—white with red, blue, black, yellow, and green; and cream with black, red or blue. The main casing is in cream or white and the facia, grill unit strip and plinth are in the other colour.

This cooker has a glass inner door to the oven, which is lit by a single burner, and has non-tilt grid shelves. The utensil compartment is concealed under the oven, leaving a clean unbroken line at the front.

The hotplate burners light automatically and the eye-level grill has a glide-away door, and has a warming rack capable of holding six large plates.



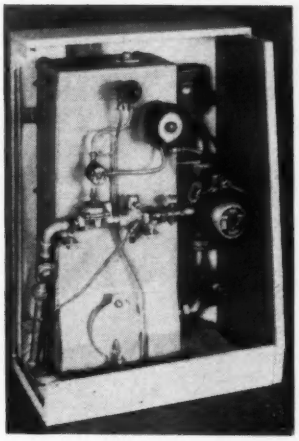
The Leisure 60.

AGA SB

The Aga SB boilers are packaged gas-fired boilers for small-bore central heating, and are developments of the Kayenco domestic range.

For use with small-bore central heating, an electric pump is introduced into the circuit and housed, together with all the other controls, inside the cleanly designed casing.

The boiler operates a dual system, the central heating circuit being cut out by the pump switch, leaving the boiler to heat the domestic hot water system only.



The controls are accessible when the front cover is lifted off, and the removal of a side panel exposes the flue ways.

The price of the Leisure 60 cooker is £41 19s. 6d., and the Aga small-bore gas-fired boilers range from £93 basic price for the SB30 (30,000 B.t.u. per hour) to £140 for the SB99 (99,000 B.t.u. per hour).—*Allied Ironfounders Ltd., (General Gas Appliances Division).*

Rhodesia will have new giant gasholder

A NEW 2 mill.-cu.ft. gasholder is to be constructed at the Rhodesian Iron and Steel Company's works at Redcliffe in Southern Rhodesia. It will be 125 ft. in diameter and 190 ft. high—big enough to contain an 18-storey building.

In 1957, when private enterprise took over the industry from the Southern Rhodesian Government, with assets valued at £4.3 mill., the Company embarked on an £8 mill. expansion scheme.

In 1959, this was increased by nearly £1 mill. by the purchase of a plate and sheet rolling mill. The new developments will bring the capital cost of the expansion to more than £10 mill.

Major item in the new plan is the doubling, at a cost of about £550,000, of the capacity of the coke oven battery. The 25 ovens which came into operation in June 1960, are producing 135,000 tons a year of excellent grade coke.

The production of the 25 ovens will provide sufficient coke to operate all three blast furnaces simultaneously.

They will also enable the by-products plant to double its annual output of 300,000 gal. of benzole, which is blended in high grade motor fuel and saves the Federation import expenditure.

Most of the tar extracted will serve as fuel. Used in conjunction with coke oven gas it is an excellent fuel which increases the efficiency of open hearth furnaces, reheating furnaces and boiler units.

The new gasholder, which will cost £250,000, will be used for the storage of blast furnace gas. The existing 1 mill.-cu.ft. gasholder will be converted to store coke oven gas.

The boiler house will be extended, at a cost of £200,000, by the addition of a tar- and gas-fired boiler and auxiliary electric generator, pumps and fans.

The new plant is scheduled to come into operation by February, 1962.

The overall expansion scheme is planned as part of an integrated unit which can be directed to meet the iron and steel needs of the Federation and to take advantage of favourable opportunities to export.

The whole available surplus of pig iron for 1961, estimated at 150,000 short tons, has been sold for export. In 1960, about 7,000 tons were used locally and 49,000 tons exported.

RISCO will not make long term contracts for the export of pig iron beyond the end of 1961.

Last year, 16,400 short tons of billet steel were sent to Britain. The balance of 6,000 tons on the order is being shipped this month.

Further opportunities to export steel have been declined by the Company until it has been able to estimate more closely the local demand for those steel sections and products which RISCO can produce.

NEWS SUPPLEMENT

OUTPUT —HOT AND COLD

PRODUCTION of gas cookers rose to 55,700 in December 1960, compared with 52,500 in the previous month. Output in the corresponding month of the previous year was 68,800.

Despite the slight improvement in retail sales, manufacturers of refrigerators are still bedevilled by heavy stocks and they are convinced that there can be no real recovery for the industry until the 20% minimum deposit in hire-purchase contracts is restored, reports the *Financial Times*.

The recent upturn in public demand has enabled dealers and retailers to reduce their stocks of 1960 models, but manufacturers' stocks have actually been increasing.

They are believed to have totalled some 325,000 at the beginning of March.

Because of the easy delivery position, dealers have been reluctant to place large orders, and manufacturers' deliveries have fallen sharply.

Robens opens big coal sales drive

MR. ALFRED ROBENS, chairman of the National Coal Board, has launched 'the most massive sales campaign in the history of the coal industry.' The object is not to lift demand above the level of 200 mill. tons a year, but to keep it constant at that figure.

In the coming months the Board will publicise coal's virtues with both national and regional advertising, says the Industrial Correspondent of the *Financial Times*. Teeth will be put into the campaign with these moves:—

1. New solid fuel boilers will be introduced by five or six appliance manufacturers in the autumn. These will burn a wide range of fuel, will require filling only once every 24 hours, and will be thermostatically controlled and self-igniting. Mr. Robens claims that the boilers will be cheaper to run than the oil-fired kind. Coal production, he said, has now been successfully 'married' to coal burning in order to tap the 'tremendous' domestic central heating market.

2. Distribution will be improved. The old procedure of stocking coal at the pitheads during the summer months will be changed, so that coal will be moved immediately by rail to the main distribution centres. The use in London and elsewhere of modern mechanised depots will be rapidly increased.

3. Merchants will be encouraged to extend existing schemes for spreading fuel payments throughout the year. Credit terms will also be made available wherever the Board sells house coal direct to the public. This, coupled with the usual policy of reducing summer prices by £1 a ton from May 1, should encourage more 'out of season' stocking.

4. Heavy expenditure on coal preparation plants will be continued. Over £70 mill. has already been invested, and another 50 plants costing £24 mill. are on the way.

5. A separate central-heating drive is being organised with the Coal Utilisation Council. Show houses will be opened in various parts of the country, in which practical demonstrations will be given of the efficiency of solid fuel appliances.

6. Plans for building the first commercial plant for production of the new 'cheery' type of smokeless fuel are being drawn up. It is expected that 'substantial amounts' of this fuel will be available by 1965.

EIRE SEARCH SOON FOR OIL, GAS

OIL and natural gas exploration is to be carried out throughout the Republic of Ireland, it has been announced by the Ambassador Oil Corporation, the Continental Oil Company and Ohio Oil Company.

The Corporation's exclusive exploration agreement with the Eire Government came into effect in March last year and participation by the companies is subject to Government approval, says the Dublin correspondent of *The Times*.

The Ambassador Company will be the operator.

Cheap gas: Will M1 pipe scheme give the answer?

THE M.1 motorway has become the key to a scheme to unite the nation's three rival energy producers—coal, oil, and gas—in an effort to provide cheap fuel, and resist future competition from Sahara oil and natural gas, says Ian Coulter, Industrial Correspondent of *The Sunday Times*.

The Correspondent adds: A high-pressure pipe laid under the 10-ft. wide shoulder of M.1, feeding supplies into London from five new coal-and-oil gas-making plants in the Midlands, is being considered by a joint study group of the National Coal Board and the Gas Council.

The Minister of Power, Mr. Richard Wood, is supporting the study group, which has already awarded a design contract for detailed plans of the first plant, says Coulter.

Two other contracts will be placed shortly with separate companies.

The first task of the study group is to investigate the building in the Midlands of five Lurgi plants near the M.1.

Under present proposals the output of the five plants would be sufficient to provide a city of the size of Birmingham with all its industrial and domestic gas, using 1 mill. tons of coal and 300,000 gallons of oil a year.

The motorway is vital to the plan as its 73 miles length runs directly from the East Midlands coalfield to London.

There has been contact between the Gas Council and representatives of Saharan fuel interests. But, says Coulter, the Government is anxious, for economic and strategic reasons, to remain as independent of Saharan fuel as possible.

COAL WASHERY FOR CANADA

SIMON-CARVES LTD. have received through their Canadian subsidiary, Simon-Carves of Canada Ltd., a contract to supply a coal preparation plant for the Crow's Nest Pass Coal Company, British Columbia.

The plant will be capable of cleaning 120 tons per hour of ½-in. coal. It will be ready for commissioning in April 1962.

Participating in the contract, worth nearly £250,000, will be a Simon-Carves subsidiary—The Automatic Coal Cleaning Company Ltd. of Carlisle—who will supply the feldspar jig washbox.

MANAGEMENT CONSULTANCY HELPS U.K. GAS INDUSTRY

MANAGEMENT consultants from nine European countries, who attended a training course arranged by the Management Consultants Association and sponsored by the European Productivity Agency in London, have learned something of the benefits which management consultancy has brought to the gas industry in Britain.

New approach

In a number of gasworks in one area a new approach to the problem of obtaining maximum yield of gas and by-products had yielded improvements of some 5%, delegates were told by Mr. E. R. Wilkinson, of Personnel Administration Ltd.

Increases in productivity of some 80% had been achieved in the laying and maintaining of gas mains and services, with cost reductions of 30%.

In a survey of sales and marketing it was found that all sales activity was concentrated on the gas showrooms, but less than 20% of the industry's customers ever entered the showrooms, leaving the other 80% unaffected.

Bonus schemes

'Accordingly,' said Mr. Wilkinson, 'field salesmen were recruited and an incentive bonus scheme was devised which placed the emphasis on the potential gas burning capacity of each appliance sold.

'Salesmen as a result earned bonus in relation to their success in building up a larger demand for gas. This scheme has been very successful in one city and is now to be extended throughout the whole of one area.'

RUSSIANS SEE ROOM HEATERS

Mr. P. G. Wright (Secretary, Watson House), explaining different room heaters to members of the Russian delegation to the I.G.U. council meeting, during their recent visit to Britain. From left to right: Mr. I. Zemliansky, Mr. A. Sorokin, (President, Russian Gas Association), Mr. A. Alexandrov, Mr. N. Grosov, Mr. Denis Scott Wilson (assistant to the Scientific Adviser to the Gas Council) who accompanied the party on their tour, and Mr. J. Wrobell (chemist).

GAS BOARD SEEKS AN ACTOR

THE North Western Gas Board is looking for an actor to train salesmen. A starting salary of £1,800 a year is offered to the successful applicant, who will work at the Board's college-in-a-mansion in the village of Hoo Green, near Mere, Cheshire.

A Board spokesman said 'Under our training methods we try to simulate the situations salesmen may encounter in real life. One of our tutors who has had acting experience and dramatic training is leaving to join her husband.'

Applicants, according to the Board's advertisement, should have teaching experience and be able to 'make and maintain vigorous, lively, helpful, and easy contact with people'.

Yorkshire Juniors draw crowd

THERE was a record attendance of more than 100 at the March meeting of the Yorkshire Junior Gas Association, held at the new group offices of the North Eastern Gas Board at Bradford.

Mr. D. M. Brear, Technical Assistant (Industrial), Wakefield group, read a paper on 'Space heating by ducted air', the theme of which was a method of design and installation for domestic dwellings.

The president, Mr. J. Edgar, of Todmorden, presided, and in the absence of Mr. J. Baxendale, Group Manager, Bradford, Mr. F. Roberts, Bradford, Junior Vice-President of the Association, welcomed the gathering to the new offices and invited members to look around.

HERE AND THERE

Solihull Council is to be recommended to discontinue its practice of providing gas boilers in new Council houses and to provide more electrical power points instead. The reason is that more tenants are buying labour saving devices and do not want gas boilers.

* * *

It is expected that the gasholder at the Mablethorpe (Lincs.) gasworks will be out of action for about four months while it is being modernised. In the meantime gas for the town will come from the main Scunthorpe supply system.

* * *

Head Wrightson Processes Ltd., a subsidiary of Head Wrightson & Co. Ltd., has been elected to membership of the Cooling Tower Institute.

Gas support for Cookery Exhibition

THE third Tyneside Exhibition of Modern Cookery, sponsored by the Northern branch of the Hotel and Catering Institute, was held on March 28-30, at the College of Further Education, Newcastle-upon-Tyne.

This exhibition, promoted entirely by voluntary workers, attracted a large number of entries for the various competitions.

A special feature was a large scale catering kitchen, provided by the Northern Gas Board. Here spectators saw the various demonstrations. Practical cookery demonstrations by gas were staged daily during the run of the exhibition.

An interesting open competition (Class 17) was that for 'A National Dish to be served Hot,' in which entrants competed for the Northern Gas Board Silver Challenge Trophy.

CORRESPONDENCE

DEAR SIR,

May I refer to two printing errors in my recently-published book, 'Domestic Utilisation of Gas.' They are:

(1) Page 230, last line, for Fig. 91 read Fig. 97.

(2) Fig. 99 on page 236, and Fig. 104 on page 247 should be transposed. This applies only to the diagrams: The captions are correct and should remain as printed.

An errata slip is being prepared for insertion in the book, but those who have already purchased copies may wish to amend them accordingly.

Yours faithfully,

R. N. LE FEVRE.

GAS WORKERS' HOLIDAYS

THE Industrial Court has awarded an extra week's holiday to 85,000 manual workers in the gas industry who have 15 years' continuous service or more.

Those with 10 to 15 years will have three days extra.

Everyone now has a fortnight's paid annual holiday. The unions had asked for a third week for all workers with 10 years' service.

The employers offered three extra days after 15 years' service from 1962.

COMING EVENTS

April 18.—WALES AND MONMOUTHSHIRE JUNIORS: Llandrindod Wells. Annual General Meeting.

April 27. — LONDON AND SOUTHERN JUNIORS: Visit to R. Cort and Son, Ltd., Reading.

April 28.—I.G.E., MIDLAND SECTION: Annual General Meeting.

April 28.—SCOTTISH WESTERN JUNIORS: St. Enoch's Hotel, Glasgow. Annual General Meeting. Paper on 'Education and Training,' by A. S. C. Morton.

April 28.—NORTHERN JUNIORS: Newcastle-upon-Tyne. Special Speaker Meeting, W. H. B. Porter.

May 4.—EAST MIDLANDS G.C.C.: Nottingham Chamber of Commerce, Smithy Row, Nottingham. 11 a.m.

PERSONAL NOTES

MR. D. D. MELVIN, Member of the Scottish Gas Board, has been appointed Secretary of the Society of High Constables of Edinburgh. The membership of the Society is 276. Its activities are now mainly ceremonial, social and charitable, and this year the Society celebrates its 350th year of existence. Mr. Melvin has been a full-time Member of the Scottish Gas Board since 1948 and before that was associated with the successful operation of the Edinburgh Gas Undertaking in which he latterly held the position of engineer and manager. He came to Edinburgh in 1933 from Uddingston Works where he was engineer and manager.

MR. G. R. BUCKLEY and MR. E. M. SUMMERS, Directors of the Stanton Ironworks Co., Ltd., MR. E. M. MARVILL, Director and General Manager of the Sheepbridge Co., Ltd., and MR. R. F. A. TURNER, have been elected Directors of the Staveley Iron & Chemical Co., Ltd. Mr. Turner has been appointed General Manager of Staveley works. The appointments have been made following the resignation of MR. S. N. TURNER and the retirement of MR. C. H. M. OWEN.

LORD COHEN OF BIRKENHEAD has been elected President of the National Society for Clean Air. The term of office is for two years only, and Lord Cohen succeeds SIR HUGH BEAVER, Chairman of the Government committee whose report in 1954 led to the passing of the Clean Air Act.

MR. B. C. MORTON, who has been Managing Director of Robert Dempster & Sons Ltd., Engineers, Elland, Yorkshire, since 1942, has also been appointed Deputy Chairman of the Company. MR. CHARLES DEMPSTER, late chairman, and SIR ROBERT PERKINS have retired from the Board.

MR. G. H. PALMER, M.B.E., deputy secretary of the South Western Gas Board, is to become Secretary, and MR. J. HOLTBY, deputy chief accountant (Accounts) is to be Chief Accountant. MR. G. F. OLIVER, M.B.E., deputy chief engineer, becomes Chief Technical Officer with MR. T. W. CLAPHAM, Area Production Engineer and MR. T. W. JACKSON, Area Distribution Engineer. These appointments have been made following the retirement of MR. J. CARR, O.B.E., M.C., deputy chairman, and MR. L. P. INGRAM, M.B.E., chief engineer.

MR. N. A. C. JAMES, Southern England area manager, Cape Insulation and Asbestos Products Ltd., has been appointed Controller, Government Contracts Division, with special responsibilities for liaison with the Admiralty, the Fighting Services and British Railways. This is a new post. Mr. James joined the Southern England area sales staff of Cape Asbestos in 1950 and succeeded MR. A. G. GRANT as area manager in 1953. MR. N. H. WIMHURST, who has been senior technical representative in the South Eastern area for the last eight years, becomes the new Area Manager.

OBITUARY

LT. COL. SHOLTO STUART OGILVIE, who died recently, aged 76, at Sizewell, Leiston, Suffolk, was at one time a joint manager of the National Gas Council of Great Britain and Ireland. He became a founder of the national body of the gas industry after World War I.

MR. FREDERICK W. DELAFIELD has died in Gloucestershire in his 80th year. Mr. Delafield was a director, manager and secretary of the Shepton Mallet Gas Company for many years before its absorption by the Bath Gas Company prior to nationalisation.

MR. F. A. RHEAD, Production Engineer, Divisional Chief Office; MR. S. SENIOR, Manager, Ramsey District; MR. R. J. GAVIN, Manager, Royston; MR. G. H. STANLEY, Secretarial Officer, Divisional Chief Office; MR. A. R. TURNER, Commercial Officer, Divisional Chief Office; MR. A. COLLINSON, District Manager, Peterborough; MR. K. R. MORTIMER, Engineer, March; MR. L. WOOLLEY, District Accountant Peterborough, and MR. D. QUIGLEY, Distribution Superintendent, Ely/Newmarket Section, have all received long service awards from the Cambridge Division of the Eastern Gas Board. All have completed 25 years' service in the gas industry.

MR. H. GAY, who has completed 43 years' service with Bristol Gas Company and the South Western Gas Board, and who for the past six years has been in charge of the Board's Internal Audit Department, has retired. Mr. Gay began his career with the Bristol Company and at vesting date was the company's assistant secretary and accountant. He subsequently became assistant secretary and accountant of the Board's Northern Division, and moved to Head Office at Bath to take charge of the Internal Audit Department in 1955.

MR. L. PIXTON has joined the Board of Glover and Main Ltd. as an Executive Director. Mr. Pixton was, until recently, the managing director of British Plimber Ltd., and was previously a director of Monsanto Chemicals Ltd. and Monsanto Plastics Ltd. He will operate from Head Office at Grosvenor Gardens, London, S.W.1, and will be primarily concerned with liaison between the parent company and the trading companies.

DAME ALIX MEYNELL, D.B.E., of London, has been re-appointed Chairman of the South Eastern Gas Consultative Council.